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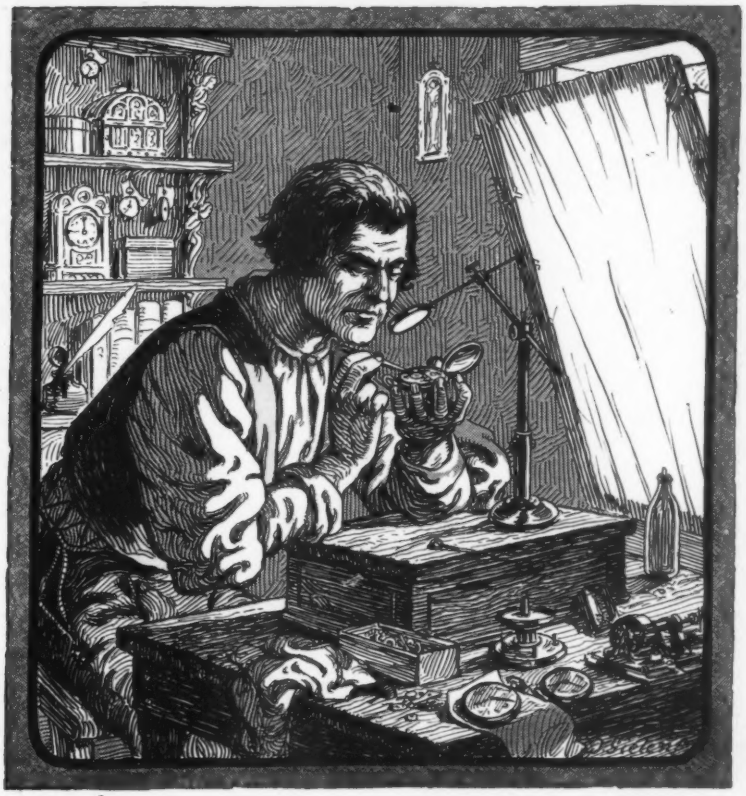

JANUARY-1929

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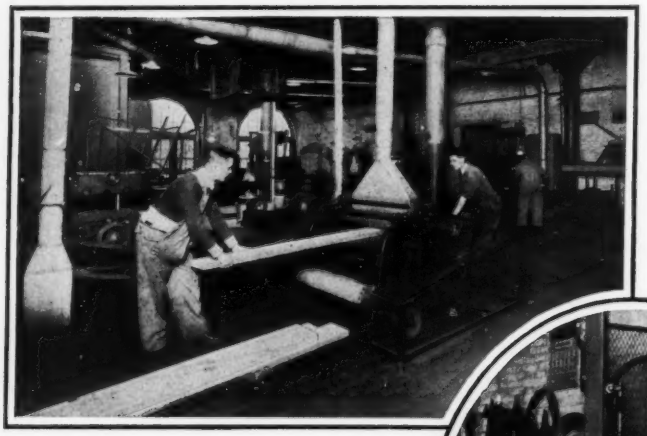

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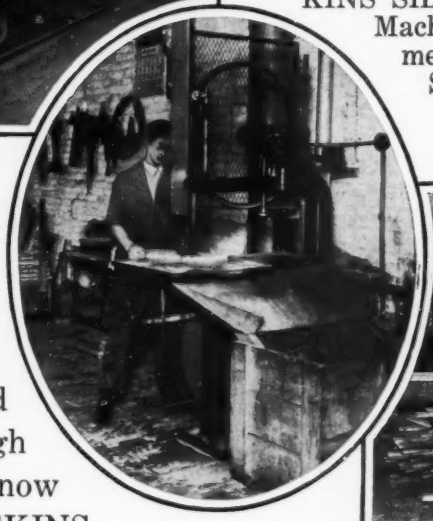

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An Educational Monthly

VOLUME XVIII
1929

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A Holiday Greeting

THE EDITORS of the INDUSTRIAL-ARTS MAGAZINE wish their readers an abundance of blessing for the year 1929. May it contain, for one and all, those recompenses which 1928 did not give.

This Issue

THERE ARE 53 problems and projects in this issue of the INDUSTRIAL-ARTS MAGAZINE. Some of these no doubt will be interesting to each and every reader of the magazine. You, too, have interesting material in your shop. Why not contribute what you have, and help your fellow teachers?

Our New Dress

WITH THIS issue, the INDUSTRIAL-ARTS MAGAZINE appears before you in a new type face, and with new section heads. Like the little girl who has just received a new dress, we like to parade before you. We hope that you will like the change, and that the more legible type which we will use from now on, will further impress you with our willingness to please.

OUR printers may be interested to know that we have chosen Linotype Old Style No. 7 for our new face. This face, with its special legibility, is almost ideal for textbook and magazine work.

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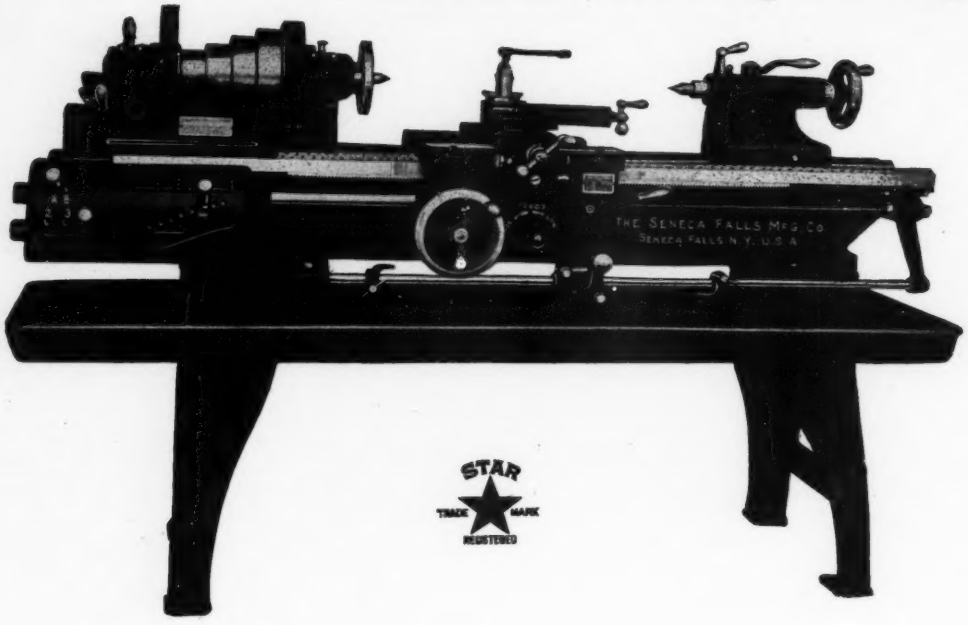
The Economy That Rests On Quality



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THE INDUSTRIAL-ARTS MAGAZINE

VOLUME XVIII JANUARY, 1929 NO. 1

The Project and Its Relation to Industrial-Arts Activities

Emerson Wm. Manzer, Supervisor Manual Arts, Bronxville, N. Y.

Part I. The Pupil-Project-Teacher Combination

PRESENT-DAY industrial arts is enjoying a recognition that has been acquired through years of steady growth. It has gone through the various systems, such as the Sloyd and Russian, and has emerged with a system that is most fitting for present-day education. Along with this change in methods of teaching the subject, has gone the change in the project. The exercise method gave way to the class project, and the class project has given way for the individual project. Today we can go into almost any industrial-arts shop and find a variety of projects being made in the same class. In short, the manual training of yesterday has been made over into a definite educational factor. The development of the junior high school, with its far-reaching influence in public education, and its natural outgrowths, are responsible, in a large measure, for the progress industrial-arts subjects have made during the past ten years. There are other definite reasons that may be attributed to the success of the industrial-arts work of today:

1. Common pedagogical principles of education are being applied to shopwork.
2. Students are being made to realize that industrial-arts activities are just as important as English, science, or mathematics.
3. The shop is recognized as a laboratory wherein scientific procedure is applied to shop subjects just as it is to physics or chemistry. Opportunity is provided for the spirit of amateur invention—creative effort.
4. Various teaching aids are employed as motivating elements, thus giving the instructor more time for individual instruction.
5. Teacher-training institutions are sending out instructors who are grounded in modern teaching skills and methods.
6. Instructors with teaching experience are keeping pace with the growth of the subject.

Instructors in the field of the industrial arts and students in teacher-training colleges, who will later make their contributions to the profession, have a problem of great consequence before them. It is the problem of keeping their shopwork or classwork up to the present accepted standard. To accomplish this, means the incorporation of the latest successful teaching methods in their daily work; it means that objectives must be expressed, as Roberts puts it, "in terms of boy attributes and boy accomplishments rather than in terms of material accomplishments or industrial units to be mastered." It means that more attention must be devoted to the actual teaching of pupils through the medium of industrial-arts subjects. The pupil is the product of the shop and of our teaching—the project, whether it is merely a bread board or a beautiful center table, is just a by-product. *But even though it is a by-product, its importance in the "pupil-project-teacher" combination is one of keystone significance.* If our objectives are going to be in terms of boy attributes and boy accomplishments we must turn our attention to another paramount issue in our particular field. The problem of choosing projects for shopwork is one that goes hand in hand with the problem of keeping shopwork up to the present accepted standard. If we recognize the project as the keystone of our structure, we can continue to build safely upon the present foundation provided:

a) That the choice of projects be such that they will aid in the achievement of the major and minor objectives of their specific activity.

b) That the project be of such nature that it will afford opportunity for related subject matter.

c) That the project be of such nature that it will not involve skills not yet attained by the pupil.

d) That the project, when completed, will be useful, have good design, and have good construction.

e) That the project be of such a nature that it will leave a residue of technical skill, defined by Selvidge as a "thoroughly established habit of doing things in a most economical way."

f) That the project be selected by the pupil of his own volition or through the psychological guidance of the teacher.

When a pupil selects a project to be made in his shopwork, he manifests an interest in the project, else he would not choose it. If the choice is being made from a bulletin board full of suggestions that are within his ability to perform, or if the choice of a project is due to suggestions made at home and the instructor feels that the pupil's ability is too limited for the project, it is the proper time to use tact in directing the pupil into a different choice. Perhaps a modification of the pupil's suggested project will tend to satisfy him and retain the interest factor.

If the pupil and the project are in harmonious relationship it is the psychological time for teaching. Thus the "pupil-project-teacher" combination is best able to function. If the pupil chooses his project and

is very much interested in making it, we have set up two inseparable bases of all education, namely, interest and attention. Interest in making a project always has the willingness to give attention to instruction. As the work progresses there are problems that arise, and a feeling of need to know is built up within the pupil. He comes to the instructor with a receptive mind, a mind-set, in Kilpatrick terms. When the pupil-teacher conference is over there is resulting satisfaction and satisfaction means learning.

Manual training of yesterday was based upon a different foundation or educational principles. Every boy made the same project without having much choice in the selection of the project. In fact, many instructors had models of what *they* wanted the pupil to make *next*. These models were hung about the walls so that an interest could be created. It was a cut-and-dried method. Each step being carefully directed, so much so that it became a matter of exercise in the execution of orders. There is still evidence of this type of teaching. Photographs of *manual exhibits* still show that twenty boys made twenty footstools or twenty necktie racks from the same blue print.

A modification of this type of instruction, however, is permissible because a fundamental principle of the learning process indicates that progress is made only when based upon instruction in the conventional order of procedure, that is, *instruction in form and technic must precede the development of creative ability or be given parallel with it*. This means that the first year and possibly the second year of industrial-arts work is the logical place for tool instruction and conventional order of procedure. This calls for project work, but it is still possible for the pupil to choose the project. Group choice in the starting grades can be easily obtained, but when this is the procedure there is still opportunity for the pupil to make individual modifications. This personal touch creates a deeper and a more creative interest in the project and opens the way for the intended instruction.

The introduction of individual ideas in a project leads to individual problems, and the individual problems lead to a desire to solve them. When this occurs, there is built up within the pupil a sense of mastery and a real sense of achievement. This type of teaching is far superior to the telling method, for in most cases, if the teacher does not do too much of the problem solving, the pupil will "dig it out for himself." This does not mean that he will be called upon to discover all that the race has found out, but it does mean that he should be given an opportunity to direct his own thinking, and to test his own initiative. After some thought has been provoked and no real progress is evident, the teacher can work with the individual pupil using psychological procedure in bringing to light a solution to the problem confronting him.

One of the best-tried methods of teaching that will aid the boy in his thinking and in the organization of his work, is the project method. It is within the plan of the combination we are dealing with in our efforts to keep the standard of the industrial-arts activities up to its present level.

Choosing Projects in a Small School

H. F. Scott, Cortez, Colo.

OUR little western town lies in a pleasant valley close to an Indian reservation. Fifteen dusty miles separate it from the railroad. Main Street is three blocks long. Our high-school enrollment is one hundred. We have an average student body that has been deprived of any training in art, music, or manual training in the grades. It is but a few years ago that domestic science and manual training were introduced in our school. It has been my lot to teach manual training and art to small classes, and in trying to arrange a course that would be profitable to the students, and meet their needs at a minimum cost, I have learned a few things.

While we call our class an art class, there are very few that have ability to draw and paint, so the major object is to give them work that will help them in home decoration. Last Christmas we failed to get an order for candlesticks, table lamps, book ends, etc., that we had ordered six weeks before for polychrome decoration, hence we had to make our own. We determined to try cement, and found that by using forms of tin, wood, and sand, many beautiful effects could be gained. The weight of the cement also proved useful in many projects. The following are notes on a few things that we found popular.

Mantel Clock

We made the forms of scraps of sheet iron for the top of the clock, while the ends and base took the form of the molding box in which they were cast. The

opening for the clock may be made with a small sleeve of sheet iron which is inserted into the cement. The

cement sets in 12 hours so that it may be taken out of the form if handled carefully. By taking it out while green, one may trace designs on it, or make other alterations if such are desired. From here on, the process is a matter of personal ideas on decoration. Some pleasing effects were produced with a coat of shellac, two coats of mahogany enamel, grained to give the mahogany effect. Others were bronzed, gilded, and silvered with undertones of green and blue. Some of the smaller clocks were enameled ivory. Before putting the clocks in the cement we anticipated the final appearance and decorated the dial accordingly.

Some of the clocks were made by placing a dash of coarse gravel in the mold before pouring in the cement. With others, we cut a monogram in the wet sand in the bottom of the form. In order to get a clear monogram, a little working over with a sharp knife, after the form is taken out of the mold, is necessary, but the general outline and foundation is there to work on. We found the square alarm clocks very easy to work up as they do not have to have the bell and legs removed as the round ones do. There are many clocks on the market that are well suited to this work. I mention the alarm clock only because it is common in every household. There are small clocks, auto clocks, and dresser clocks that would all work up well. There is no limit to the decorative possibilities with the gesso or polychrome after the clock has taken shape.

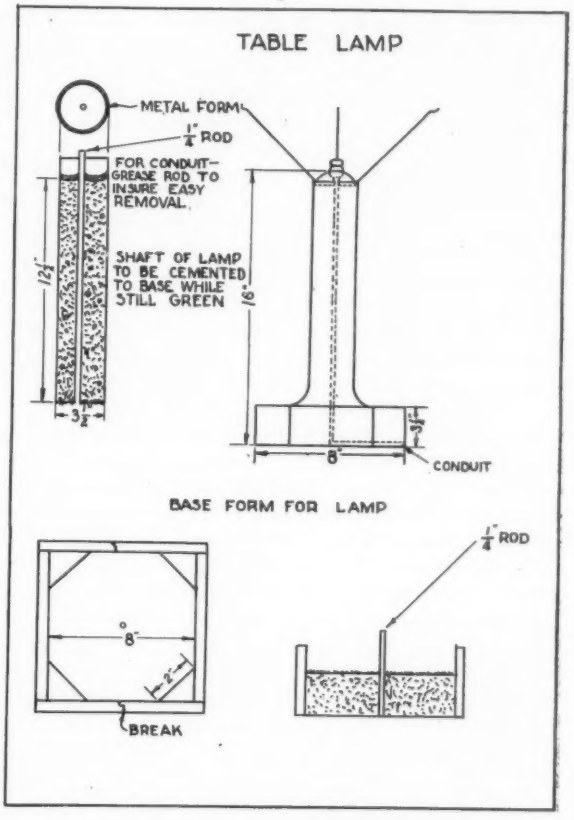
Book Ends

We made a trough with two 1 by 6's 4 ft. long for our book-end mold. This made several sets at a time. Care should be taken to nail the end blocks B on squarely so as to allow the cement to settle at a uniform depth in the trough. I might state here that a mixture of 1 part of cement to 5 parts of well-screened sand is a sufficiently strong mixture. The mud should be stiff enough to hold a firm shape when dashed in the mixing pan. With the cement ready, let us proceed with the book ends. Throw two handfulls of cement into the V mold you have prepared, then put in a small board perpendicular to the sides of the mold to separate the book ends and then some more cement and another division, taking care to make each section the same length. This matter of molding may be done in many ways, but we found the above plan the best because the cement comes out of the form very easily by tapping off one side and end of the mold, and taking out the division boards.

We attempted to work utility into our book ends. By inserting old ink bottles before the cement is set, we were able to make an inkwell that was out of sight, and hard to tip over. We inserted round and oval solids that left very even cavities which could be used as incense burner trays. Some cavities for this purpose were made by using wads of paper. With a little stiffer mixture we also formed heads of cats, dragons, and birds for incense burners. There is no limit to the useful things that can be inserted in such book ends. For instance, some of those made had smoking trays, stamp boxes, stationery holders, candlesticks, trinket drawers, looking-glass, picture in frame, and small jar for flower vase cast as integral parts with the book ends.

Candlesticks

By sifting sand into a box 12 by 16 in. to a depth of from 4 to 6 in., one has a good molding bed. The sand should be sprinkled so as to hold a firm shape. Then with the fingers, or a short, round stick, cut the form of a candlestick longitudinally. Then pour the cement into the mold and build the remaining half of the candlestick above the sand. The square bases are made by letting them be formed against the side of the box. By daubing the last cement on the sides, it will well represent a molten mass, especially if finished in bronze. Most of the cement work will dry more evenly if covered with a thin coat of sand and thus prevent cracking. By taking the candlesticks out while still green, it is easy to make the candle holder in the top with any sharp tool, or you may cast a brass holder into the top while the cement is wet.



We made fair-looking table lamps in the same manner, only we used forms, as shown in the illustration for molding. The cement alone leaves a fair finish, but most of our work was covered or designed with a gesso made of plaster of paris and shellac. We found it easier to handle by squeezing it through pastry cones made of brown paper. In this way a multitude of effects can be produced.

The Educational Trinity

Education does three things: It creates wants and desires; it enables the possessor to render service, and the consumer to become a producer; it makes a higher wage possible.—*J. V. Hamilton.*

The "Plan Your Future Home" Competition

Albert G. Bauersfeld, Director, Technical Work, Chicago High Schools

FOR ten weeks during the past semester, the 19,780 pupils taking drafting in the 24 senior high schools of Chicago, have been engaged in a competition under the intriguing slogan, "Plan Your Future Home." The 89 teachers of mechanical drawing, and the principals in the various high schools, have taken hold of this project with a great deal of enthusiasm. The weekly school papers in the high schools have carried announcements of the progress of this competitive architectural-drawing exhibit. Each high school had its preliminary exhibition during the last week of March. Architects, living in the community of each high school, served as judges for making the awards of first, second, and third places in each of the four distinct classes of the competition. The final exhibition was held in the Board of Education School Administration Building, during the first week of April, where the winning drawings of each high school were judged by prominent architects for the final competition.

The Chicago Chapter of the American Institute of Architects cooperated in many ways to develop the city-wide program of planning future homes by high-school students. The committee of prominent architects, who acted as judges for the final competition, was selected by this Chicago Chapter, and the personnel of this committee was composed of architects who were responsible for designing many of the new sky-scrapers that are being erected in this city.

Awards of appropriate ribbons of various colors were given for first, second, and third places and for three honorable mentions in each classification of drawing. In this way, the work of 24 pupils was given distinction in the grand finals. The offering of cash prizes, or anything having a distinct monetary value was carefully avoided throughout the whole competition. Past experience with high-school competitions has shown that it is not desirable to make awards of monetary value, because it sometimes leads to bitter rivalry and unsportsmanlike conduct. Throughout this architectural-drawing competition, the emphasis was placed on the professional conduct of the high-class architect, and on winning distinction for the glory of each school, and not for the individual alone.

All of the pupils taking architectural drawing in the Chicago high schools will not, necessarily, become architects or builders. Some of them, however, do, and the foundation work laid by the high schools can be continued with four years of advanced study in colleges offering training for architects. However, most students in the high schools are potential home owners, therefore, an elementary training in house planning is a valuable experience which the boys and girls, taking architectural drawing in the Chicago high schools, are receiving.

The architects of Chicago were enthusiastic in their support of the city-wide program of "Plan Your Future Home," because the general tendency, as announced by the daily papers, was to elevate the standards of quality for home building. These architects were also looking fifteen years ahead to the time when these interested boys and girls would become intelligent customers, who would wish to build homes that would adequately serve the needs of a typical American family.

It often happens that adults set out to build homes without any knowledge of the preliminary steps required to plan a home intelligently. These adults consult architects and contractors, and have plans and specifications prepared according to rather hazy verbal descriptions of what they require. They are unable to read plans of houses drawn to scale, and, consequently, when building operations are under way, many changes are requested, which pile up extras on the original building-cost estimate. When architects and contractors have customers that can read the working drawings, and are able to visualize sizes and proportions of the rooms, halls, and so forth, much more satisfactory business dealings can be carried on.

The picture in the mind's eye of a customer, who has no training in reading architectural plans, is often entirely different from that which he is able to describe in words to a designer of a building. When the foundations of a building are laid, the customer feels that he is going to have a tremendously large home. Just as soon as the framework has been raised, and the partitions placed, this building seems to shrink in size, and he begins to want to make changes in shifting partitions, doors, and windows. The work of the architect and contractor now becomes difficult because all such changes require additional material and labor, which must be paid for as extras. If a home builder knows exactly what he wants, most architects and contractors are anxious to give satisfaction.

The idea of planning a future home, and working through all the details necessary to make a complete working picture, made a strong appeal to the boys and girls who are taking architectural drawing in the senior high schools of Chicago. Here was a project problem which was real, and which stirred the imagination of these young draftsmen to attempt something that was worth while. Fathers and mothers at home were drawn into conferences, and much discussion was developed in the family council around the dinner table.

The city-wide program for the Chicago senior high schools was offered in four groups or classifications:

Class A. A complete set of drawings for a six-room house, to be prepared by senior students taking architectural drawing.

Class B. Complete set of drawings for a five-room bungalow, to be prepared by junior students taking architectural drawing.

Class C. Drawings of building details to be prepared by sophomore and freshmen students taking architectural drawing.

Class D. Drawings on the rendering of the classical architectural orders by junior students who are specializing in this particular field.

A central committee of teachers had written up specifications for each of these four classes of archi-

tectural drawings. Copies of these specifications were placed in the hands of all drawing teachers, requesting them to invite their pupils to enter this competition, which was in the nature of a project problem carried on in the classes in addition to the regular course of study.

A great deal of interest and enthusiasm was developed in the Chicago senior high schools as a result of this program of planning future homes. In order to simplify the problem for these neophite architects, suggestive sketch plans were sent out for a typical six-room Colonial residence and for the bungalow. These sketches were not followed in toto. Some of the doors, windows, and so forth, of these sketches were purposely omitted in order that each pupil might have the problem of placing these details according to the way they proposed to arrange the furniture in each room. In order to plan a room intelligently, each designer must visualize where the bed in a bedroom should be placed; where the gas range and cupboards in the kitchen should be placed. If such details are neglected, one cannot intelligently plan the openings of a building. Many combinations may also be made by changing the location of the rooms, the hall, the vestibule, the stairs, the doors, and the windows. It often occurs that an adult will plan an attractive living room on paper, but when the building is finished, the doors and windows have been so poorly located that there is no proper location for the piano or davenport. The instructors of architectural drawing required their students to think of these important details in planning their future homes.

The two-story building was not to exceed an estimate cost of $20,000, and the limit set for the cost of the bungalow was $10,000.

All pupils entering this competition were required to make a complete set of plans using a scale of ¼ in. to the foot. They were required to make one side and one rear elevation, and also a section of the building, showing all ceiling and roof heights. Large-size details of the entrance to the building, or some other particular exterior feature, were specified; also the fireplace, and other important interior details were suggested. To make the plan complete, a plot of the building lot was drawn showing the location of the house and the garage on the lot, and suggesting other developments of the property, such as trees, shrubs, lawn, garden, walks, and driveway, which added to the completeness and attractiveness of the residence, and which was in accord with the requirement of a person of moderate circumstances.

The problem of developing a competitive program among the 24 high schools of Chicago is rather complicated because of the many variables. Our smallest high school enrolls about 800 pupils, and our largest high school enrolls about 8000. We have general-course high schools where architectural drawing is elected five hours per week, for 40 or 80 weeks. We have three technical schools for boys, where drawing is required five hours per week, for four years, during which time architectural drawing is studied for sixty weeks. In these technical high schools there are also vocational courses in architectural drawing in which boys work twenty hours per week for 160 weeks. Such variable conditions required a general ruling that no school was to submit more than 24 drawings in the final competition.

Up to the time of judging, the 500 carefully selected drawings on display in the corridors of the board of education building, showed such a high degree of skill, that it seemed as though the honors were to be equally divided. The drawings on display had no identification marks that could be seen because the name of each pupil, and the school, was sealed in an envelope and pasted behind each drawing, thereby eliminating any thought of partiality.

A critical and careful study was made by the judges of each drawing submitted on the basis of originality, good building construction, quality of drawing, technic, and good lettering.

Under these exacting conditions, it was rather remarkable that the boys of the Austin High School won six prizes and two honorable mentions out of a possible 24 awards of merit.

The Austin-High-School pupils, under the direction of Philip E. Burness, instructor, captured first, second, and third places in Class A, or the two-story-building group. In Class C, or the building-detail group, they won first and second places, and two honorable mentions. In Class D, or the classical architectural order group, they won second place.

These results again show how the work of pupils is stimulated through the efforts of an exceptionally well-trained teacher. Mr. Philip Burness is a graduate of the architectural college of Armour Institute of Technology, and, in addition, is a clever all-around artist. Unfortuntely, the photographic reproductions of the winning drawings of the Austin-High-School pupils are unable to show the soft color blending effects produced by combining a wash-color drawing with an air-spray color, stippled rendering.

The "Plan Your Future Home" program was placed before the pupils taking architectural drawing in the Chicago public high schools as a sort of a challenge to bring out the best qualities of originality and good workmanship in each boy.

Instead of the daily task of grinding out the sequential architectural-drawing plates, each pupil was encouraged to design a house that would satisfy the needs of his own family. Visions of castles in Spain were postponed for the more practical job of planning a modest house in the environs of Chicago.

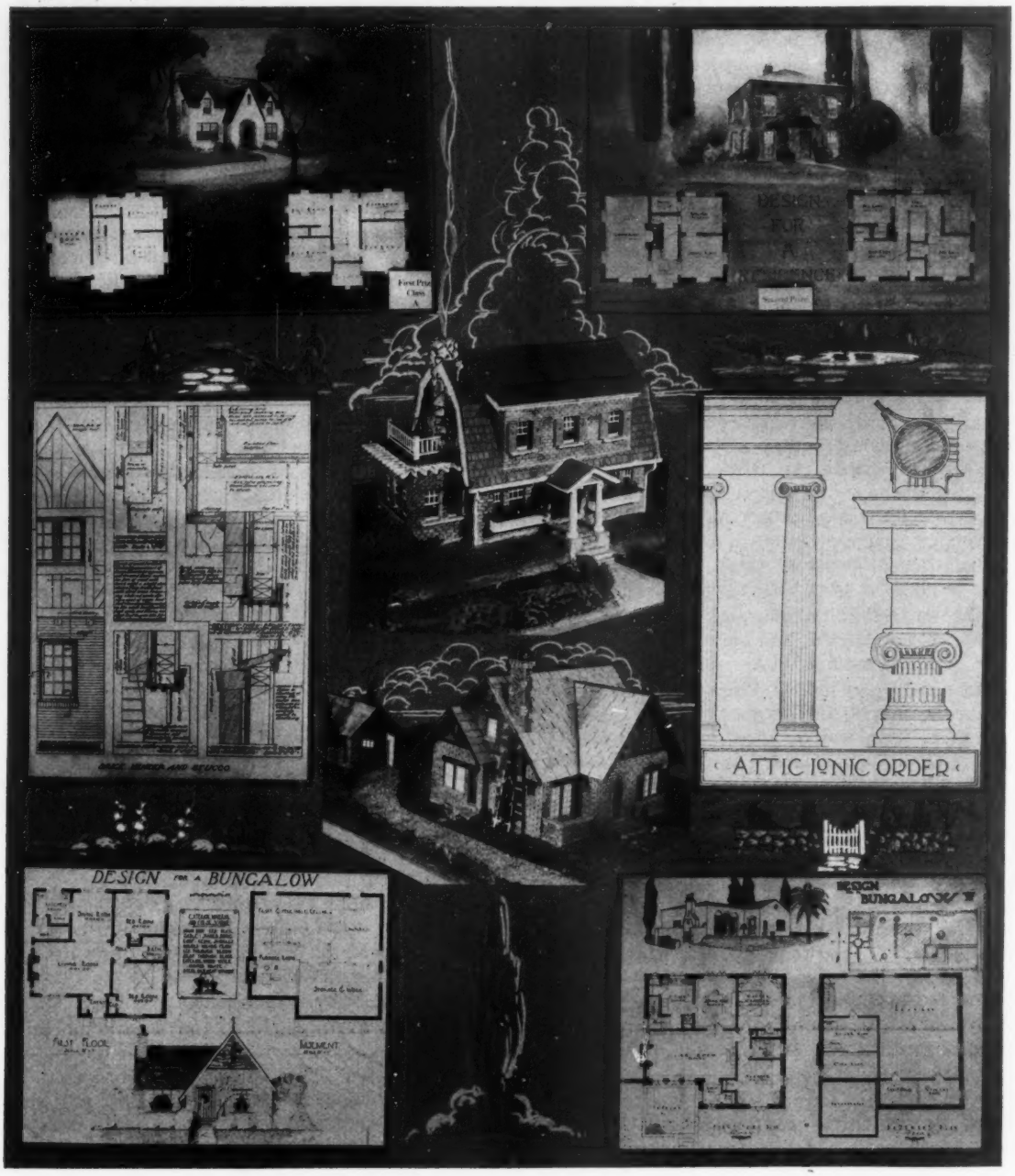
Each project problem required that the boy should do his own thinking, and see the job through from the beginning to the end without the aid of his teacher to show him the way, step by step. These embryo architects had to draw on their past experiences and training, they consulted references, they submitted preliminary sketches, and they talked things over at school and at home.

Voluntary homework after school and on Saturdays was freely and joyously given by each boy, because he felt that here was a chance to show that he was capable of doing a finished job of home planning that would compare favorably with the work of boys in the other Chicago high schools.

For ten weeks the author of this article had a great time inspecting the 248 high-school classes in

architectural drawing. All of the teachers and pupils appeared to have more zeal and enthusiasm. In my opinion, an occasional project problem in every school subject is very much worth while. In my visits I found that this architectural drawing competition program stirred up the imaginations of other pupils in each school, and created a desire for an opportunity to try out a similar problem. I believe there is now greater interest in the study of architectural drawing in the high schools than ever before.

This competitive architectural project problem was very much like playing a game. It was not



Reading from left to right:

TOP—

1. Class A, two-story building. First prize. Charles Farm, Austin High School.
2. Class A, two-story building. Second prize. Howard Colbwin, Austin High School.

CENTER—

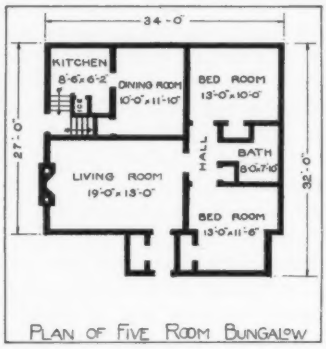
3. Class C, building details. First prize. Harold Polusny, Austin High School.
4. Class D, architectural order. First prize. Emil Lattyah, Tilden Technical High School.

BOTTOM—

5. Class B, bungalow. First prize. Morris H. Beckman, Senn High School.
6. Class B, bungalow. Second prize. Norman Stevens, Morgan High School.

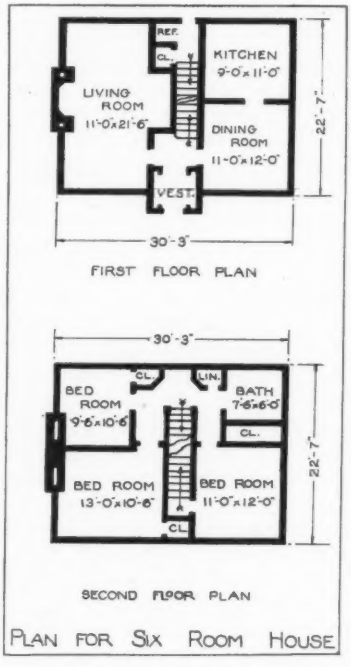
Two miniature houses, typical of those that were submitted, are shown at the center of the illustration.

limited to the participants only, for I observed many other pupils looking into the drawing rooms while the classes were changing. I noticed that they felt as though they had a part and an interest in the drawings and miniature houses which were under construction. To me, this situation was like the spectators at a baseball game; each one chooses his own team and picks out his favorite players, and then lives through the developing situations as the game progresses!



SUGGESTIVE SKETCH PLAN. WINDOWS AND DOORS OMITTED, ETC.

Some boys were not satisfied with only meeting the requirements of the drawing competition. In addition, they built out of various materials, miniature houses, according to scale—from the plans they had



SUGGESTIVE SKETCH PLAN. WINDOWS AND DOORS PURPOSELY OMITTED, ETC.

designed. In this respect, they responded to the impulses of a professional architect who is eager to superintend and watch a building take form according to the plans he had prepared.

Some of the outstanding miniature houses on display were as follows:

Two-story Spanish stucco house . Roosevelt High School
Two English-type houses . . . . . Calumet High School
Italian villa cast in plaster . . . . . Lindblom High School
Dutch Colonial . . . . . Lake View High School
American-type bungalow . . . . . McKinley High School

School officials approved of the architectural-drawing competition. William J. Bogan, Superintendent of Schools, said: "The architectural-drawing competition, which has been in progress in the Chicago high schools during the past ten weeks, has created a great deal of enthusiasm among the pupils and teachers.

"A project problem like this, growing out of the regular classroom work, stimulates pupils to creative efforts that are decidedly worth-while experiences.

"The originality and technic displayed through the drawings now on exhibition, give evidence that high-school boys and girls are greatly interested in the problems of adults—that of planning and designing future homes."

Miss Genevieve Melody, principal of Calumet High School, when interviewed on this subject, made the following statement:

"Architecture, as a fine art, is finding some of the noblest of its modern expressions in America. As a vocation, it offers fascinating and ever-increasing opportunities to young people of certain gifts.

"An exhibit like this should prove a stimulant to students and teachers, and its significance cannot fail to interest the public."

Special Talents

The value of drawing as an aid to thinking is no more dependent upon the possession of special artistic talent, than is the value of language or arithmetic upon the possession of special literary or mathematical talent. Where special talent does appear, it should be discovered and its particular tendency should be cultivated as a social asset.—*Walter Sargent.*

CRAFTSMEN THREE

Davis and John's Son and Roland
Laboured long with heart and hand
And came at last to understand
The joy of good work finely planned.

Davis moulded the clay aright
With fingers sensitive and light,
He saw within the finished bowl
The dream that shone within his soul.

John's Son plied the weaver's art,
With Flemish craftsmen held his part,
He wove brave garments patterned gay
For folk to wear on holiday.

Roland lived 'twixt monastery walls,
Yet laughed within the shadowed halls
As he a psaltery did make,
Writ beautifully for Jesus' sake.

Davis and John's Son and Roland
Laboured long with heart and hand
And came at last to understand
The joy of good work finely planned.

—*Ruth Ainsworth.*

The Teachers World, London, England.

INDUSTRIAL-ARTS MAGAZINE

EDITORS

E. J. Lake *J. J. Metz* *S. J. Vaughn*

VOCATIONAL GUIDANCE

One of the most important factors in our educational organization today is that of vocational guidance. This subject has not reached the rightful place it deserves in all our school systems, but we are safe in saying that it is a subject of more thought now than a few years ago.

To have a guidance program worthy of the name, some one person or small group of people should be responsible for its administration. It is not enough to depend upon the overburdened instructor to do as his limited experience in this line prompts when the occasion arises. With no executive head, actively engaged in promoting the guidance program, no systematic results can be expected. In spite of this well-known truth, how many cities we find with the hit or miss, "let-George-do-it" policy of guidance.

The guidance problem is not new. It is as old as education itself and will continue through individuals with some good results, regardless of any concerted effort to place it on the advanced scientific basis which is possible under present conditions. Some of the best examples of guidance were the product of former years before the organized school system awakened to the possibilities in this branch of study. This, however, is no assurance that in our present complex civilization the methods of the past will function equally well. Yet, we have those who agree that guidance is important but leave it to the mercies of teachers, who in many cases do not know what constitutes true guidance.

If a boy could choose more intelligently; could come closer to making a choice of vocational which is suitable to his capacities and inclinations; could be given a wider range of experiences as a background from which to choose; could see or experience many of life's industries as they really are; and could be made to sense the situation which has been created for his benefit; it would be much better for the boy, for industry, and for society in general.

These things cannot be gained in a day or in one course. Neither can they be gained through school-shop experiences alone. To depend upon the boy to accumulate these experiences without having his attention called to them through a guidance organization is expecting a great deal.

OH YE WISE ONES

Not infrequently one meets statements both written and spoken, which in a few terse sentences tell the world what is wrong with that expensive fad called vocational training, and that still more reprehensible off-shoot, vocational guidance.

The critics, wise in their own deceit, can quote how much the Federal Government pays out for this kind of work each year, and how much the individual states add to the sums thus expended by the central government.

They naively state that the whole idea is primarily based on the desire of certain schoolmen who want fat salaries and an easy job. These office seekers, so 'tis said, look upon the government appropriations as incentives, not for bettering the educational facilities which are to be offered to the young, but for increasing their own fortunes.

The critics picture the schoolroom as a place where only special knowledge is dispensed, the teacher as a charlatan who gives a test to the student and then decides for him what training is to be given. They glibly tell of how vocational guidance is dispensed by young, inexperienced college graduates who act as counselors, and who get their inspirations from a few pamphlets on occupations. Finally, the placement attempts of the school are given a few well-directed blows and the whole structure of vocational training as it exists today has been definitely settled as unworthy of further notice, and with a mental "well, that's that," the critic goes to some other weighty subject with his iconoclastic axe.

Now, shall we, who are engaged in the industrial arts and the full-time and part-time vocational-educational work, confound the poor man by admitting that we know that our work is not 100-per-cent perfect? Shall we admit that we know that our terminology is unstandardized, and that it is as troublesome to us as it may be to him? Shall we tell him that we know that vocational guidance and placement has caused us many sleepless nights and that we know, too, that we are far removed from the final solution of our problem? Shall we invite him into our classrooms and school shops, where he can see how we have to work for a not-too-munificent salary, a certain number of hours each day, and then acquaint him of the number of hours which we, voluntarily or involuntarily, put in on extracurricular duties?

Will it help the cause, and will it help the critic, if we show him how hard we are at work gathering occupational data so that we are able to assist the helpless boy who is confronted with the task of choosing his life's work from among the 500 occupations, 3,000 industrial employments, and 9,000 different jobs? Or shall we simply say, "What's the use?" and continue to "See the truth, as God gives us to see the truth," and work on to the end that our imperfect work become more and more perfect, even though we make more errors as we go on in the work of perfecting?

AMERICA AND EDUCATION

Under the title "Selection" the Antioch Notes, published semimonthly by Antioch College, Yellow Springs, Ohio, sent out an editorial which clearly outlines America's obligation. The following is a part of this editorial:

"America, like a child, is rapidly developing and maturing outlooks and traits which once established, will largely determine its lasting character. If we can survey the whole cultural inheritance of mankind, select the elements of universality and of most enduring values, and weave them into the texture of our

national thought and life, we can forerun a greater and final civilization than the world has known. Education in America must mean nothing less than this.

"The Outlook. America is unique. Seldom before, and perhaps never again, can history record a great region being occupied by men from nearly every land, coming voluntarily to work out their own destiny. Here, with varied inheritance of blood and culture, they pour into the melting pot, to emerge a new people with no counterpart on the earth.

"Only in part are the new patterns of life the products of geography and climate and of blood. If we will, we can deliberately design our future. We can survey and appraise the whole cultural resources of mankind, taking or rejecting as judgment directs. We can observe where tradition fails, and where the synthesis of new methods is good. In this process, judgment becomes more inclusive, and there is increase in capacity to go beyond precedent with new creation.

"This rare opportunity makes education in America very different from education in Europe. There its chief recognized business is to carry forward well-established traditions, and to trace them back to their roots about the Mediterranean.

"Great forces work upon our heterogeneous population, impressing upon it uniformity of life and thought. The newspaper, radio, moving pictures, and commerce with national advertising, seek present profits, with no great sense of responsibility for our cultural future. In contrast to these, or filling in the gaps where they fail, American education stands as a great constructive force for creating a new world. Its effort to develop the full cultural possibilities of a whole people is a new phenomenon.

"The very size of the job is unprecedented and staggering. Were ever imagination and romance and the spirit of manifest destiny visible on a greater scale? Did ever an undertaking so challenge thought, skill, and courage?

"Investment. It is right that the present time should pay the price of undertaking to establish a great cultural inheritance, for our present great prosperity is based on extremely prodigal consumption of our great stores of coal and oil and ore, and of our rapidly waning virgin soil fertility. That prodigality can only be justified if it leaves the maximum residue of enduring value.

"Most wealth in its expenditure is 'sunk without a trace'; nothing is left which adds to the permanence or value of human existence. A sound economy will strive to overcome this tendency, and to transmute present prosperity into lasting value.

"Nothing of human origin endures so long as the habits and outlooks of men. The antiquities of Sumeria, Egypt, and Assyria impress one with the fact that European civilization is not a new creation. In thought and in action Europe is a continuation of those older cultures of whose material creations there remain only the pyramids and fragments of buried treasures. An impression written in the mind of man is more enduring than stone.

"If American education can give general currency to the finest things in the world's cultural inheritance; and can instill habits of intellectual growth, and the temper of aspiration, of great expectation, of critical and open-minded inquiry, and of adventure—these qualities will continue to enlarge the lives of men and to bear fruit long after our railroads have rusted away and our factories are obsolete.

"We must be forever alert that American education shall realize its full possibilities of productiveness and economy, that the types of educational opportunity we supply shall be more varied than at present, and better adapted to the capacities and traits of the persons educated. But while we must not tolerate waste or inefficiency, education ought not to be thwarted by short-sighted limitation of support. Americans who see into the future will grant ample resources to public education.

"Quantity and Quality. Even the finest relationships, if very common, tend to become commonplace, and to lose their glory in the hands of stupidity. Education in America faces this danger. The whole system labors under the necessity for quantity production. Growth in numbers being educated has been so rapid, and the supply of well-trained teachers with aspiration, imagination, and intelligence so inadequate, that wholesale methods could not be avoided. Arbitrary standards introduced to improve the average teaching often neutralize the spirit and work of the best teachers. Appropriations for education, though great, fall far short of providing good training and of paying for a fine quality of service.

"Against these obstacles American public education is making a great fight. Probably never before in history has so much well-directed intelligence been used to educate a whole people. But in addition to education in the mass we must have pioneers exploring the path ahead and arousing aspiration. Otherwise education may become routine and the spirit of adventure may die."

SAFETY

Shop teachers, on the whole, have long looked upon safety in the school shops as being their particular responsibility, yet there are many things to be considered if freedom from accidents is to be achieved. First and foremost is the setting of proper standards. How often, in the production of a difficult piece of work, are we, as teachers, guilty of setting wrong standards by throwing off a guard on this or that machine in the shop, in order to expedite the production of our work. The boys observe this. They, too, are as anxious usually to finish a job as the teacher is. They do not, however, possess the proper judgments as yet, so that they can avoid accidents by using extra care while working on an unguarded machine.

Too many of us rely on a few safety talks during the school year to acquaint our pupils with the salient points to be observed in running dangerous machinery. We forget too easily that familiarity breeds contempt, and that the boys who become familiar with certain machinery lose also their fear of accidents that might happen in the use of this machinery. Vigilance, plus a great deal of safety instruction, plus a rigid adherence to all of the safety rules, while we ourselves use the machinery, will insure our students against accidents, and make us feel that we are really living up to the obligation which our position imposes on us.

PROBLEMS AND PROJECTS

This department aims to present a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in woodworking, turning, patternmaking, machine-shop practice, sheet-metal work, forging, foundry work, auto mechanics, auto electricity, electricity, architectural and mechanical drafting, printing, bookbinding, concrete work, farm mechanics, home mechanics, and other lines of industrial-arts work are desired for consideration.

A CUE ROQUE TABLE

H. W. Kroll, Buhl, Minn.

Frequently, the teacher in cabinetmaking seeks a class project in which millwork is included, or he may want a problem to provide for an individual student who is able to undertake special work. The game table described herewith, is an answer to just such a problem. When a boy sees that clean, wholesome sport is provided by his piece of work when it is finished, no special efforts are needed to arouse his interest.

The game of "cue roque" is, in reality, indoor croquet played with pool balls and cues. It is simple, yet involves all of the elements necessary to play any other game on the pool table. The rules for outdoor croquet may be used. The method of banking against the cushion for placing a play is permissible, or, to make it more scientific, the difficulty of billiarding on a second ball may be added.

Introducing "cue roque" into a community may be of assistance in solving the boy problem. If there are no organizations for boys, it would not be amiss to consider placing several of these tables in the public school where a room designated for the boy's recreation outside of school hours could be used by the boys. The boy is then taken out of the pool-room atmosphere and is training himself, under supervision, for clean fair play in the game of life.

Construction of the Cue Roque Table

The table is built as nearly to the measurements of a pool table as possible, and material that is heavy enough to give stability and strength must be used.

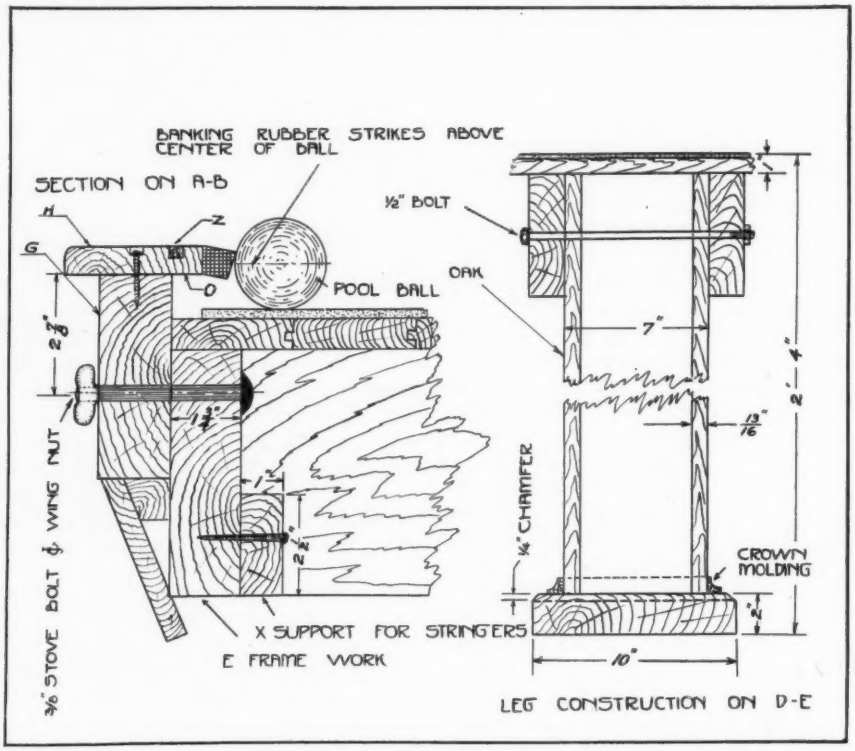
First, build the outer frame E which is 4 by 8 ft. outside dimensions. After fastening this on its supports, space the 10 stringers evenly, according to the distance on the drawing. Fasten them with wood screws or nails. In order to save time, all the pieces may be cut to size and set together before assembling. The flooring is nailed on the stringers to form a substantial surface for the beaver board. Box nails and glue are used to hold the beaver board in place.

The rubber cushion is fastened to piece H (Fig. 2) with Le Page's liquid glue which has been warmed in hot water.

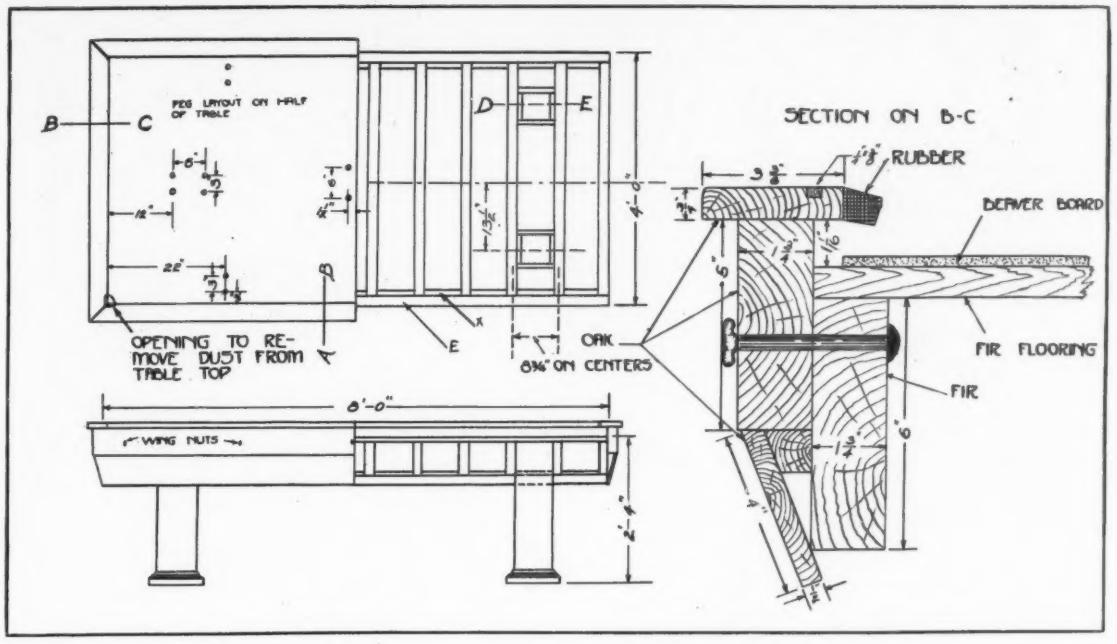
Pieces G and H can be fastened together with screws and glue, the screws being set down below the surface, thereby allowing a piece of dowel to cover the screw head.

The side pieces, which held against the framework E with the wing nut and bolt, can easily be removed for the renewing of the felt covering. To cover the rubber cushion, remove strip Z, insert one edge of the felt, and slip the strip back into place. Draw the felt tight around the rubber and tack underneath, at O.

Before boring holes for the bolts on G, test the position of the cushion in order that it strikes the ball above the center, thereby, avoiding chance of having the ball hop off the table.



DETAILS OF CUE ROQUE TABLE.



The hole for the pegs are located according to the drawing and bored before the felt is stretched on the top. Before cutting holes in the felt, drop a little glue where the hole is to be cut and let it dry. This method insures a better hole and avoids the possibility of tearing beyond the opening of the peg.

The felt, pegs, and cushions may be purchased from the manufacturers of pool and billiard tables.

BABY COUPE

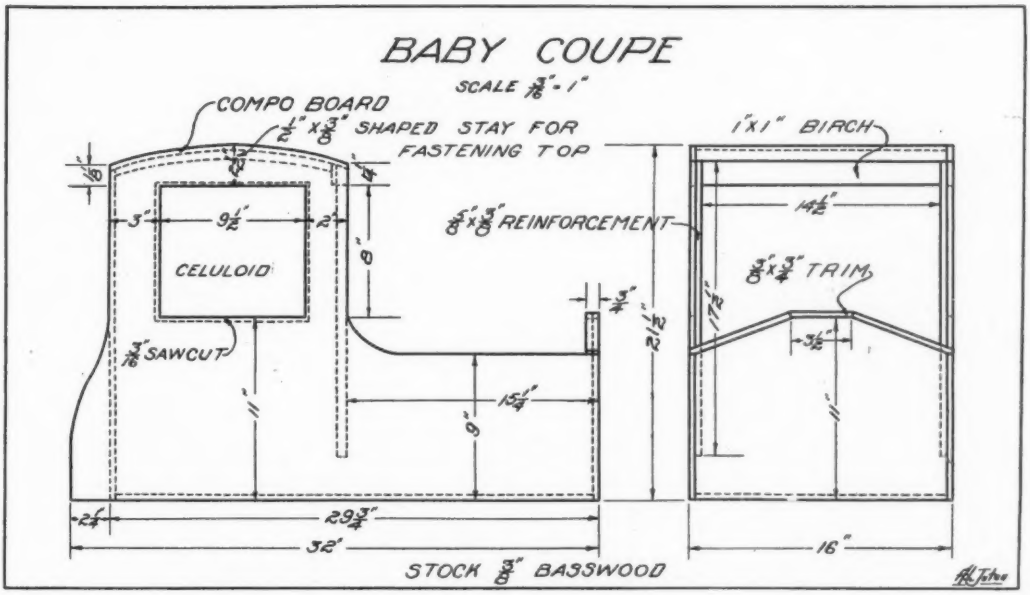
Adolph L. Juten, Duluth, Minn.

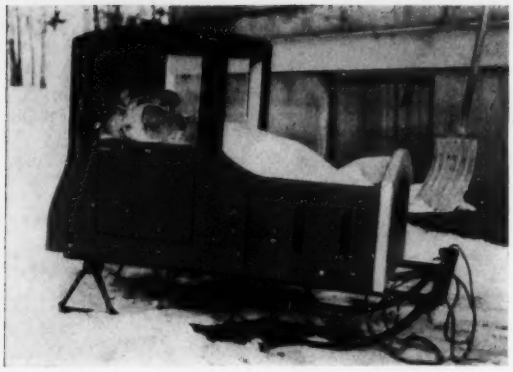
The baby coupe described herewith is very simple and has been found very attractive to boys of junior-high-school age. Its appearance belies its weight as it is made of ⅜-in. basswood and is very light.

The streamline sides are cut and added to the bottom board, while the back is allowed to project to the top of the cab and the remainder of the top is built up on it. A piece of 1 by 1-in. birch is used in the front of the top to reinforce the whole structure and act as a grip when it is necessary to lift the sled. All of the joints are glued and nailed with 1 or 1¼-in. brads.

The windows are made of celluloid for the sake of safety in case of a "spill" and are set in a $\frac{3}{16}$-in. saw cut in the frame. The roof is fashioned from compo-board which can be either dampened and shaped or creased with a blunt tool until it conforms to the shape of the top members.

Three colors of quick-drying paint were used in finishing the "Fisher" body. Green was used as the body color, black for the top, and aluminum for the radiator. The striping of the doors and ventilators in black, of course, make this coupe realistic, to say nothing of the door handles in aluminum.





BABY NOT FURNISHED WITH THE COUPE

This body is fastened to the chassis by four 2 or 2½-in. flat-head screws through the bottom of the body into the cross members of the sled. The screws are countersunk flush with the bottom.

This coupe makes a very comfortable cab for baby, as mother can easily bundle it in so that the cold winds do not get at it.

DESIGN AND CONSTRUCTION OF RADIO CABINETS

E. M. Winterbourne, Denver, Colo.

In the construction of the home-built or school-built radio set, too often the cabinet has received very scant attention. Since the radio is to be one of the permanent fittings of the home, the radio cabinet should be well constructed, have pleasing proportions, and suitably decorated. In the series of designs which follow, we have tried to keep these essentials in mind.

The Table Type of Cabinet

This is the cheapest and easiest type of radio cabinet to build. It may be designed just large enough to hold the set itself, with the batteries in a separate box under the table, or it may be made large enough to hold the batteries as well.

In any designing, the lower part of the design should appear the heaviest. In this type, the bottom should be three fourths of an inch or more in thickness, and should extend out beyond the ends, front, and the back, from ½ to 1 inch. Several suggestive designs which may be used for the edge of the bottom piece are shown in the cuts. If the tool equipment is limited, one of the chamfered edges would be best to use. A simple line carving, executed with a veining chisel, and with color rubbed into the depressions adds beauty and distinction.

The top, ends, and back should be made of material ⅜ or ½ inch in thickness. These pieces should all be carefully planed, cut to exact sizes, and accurately squared. The joints used should be either the dovetail or the combination of dado and rabbet joint shown in the detail. This combination of dado and rabbet joint is easily and quickly cut on a circular saw, but is not difficult to cut by hand.

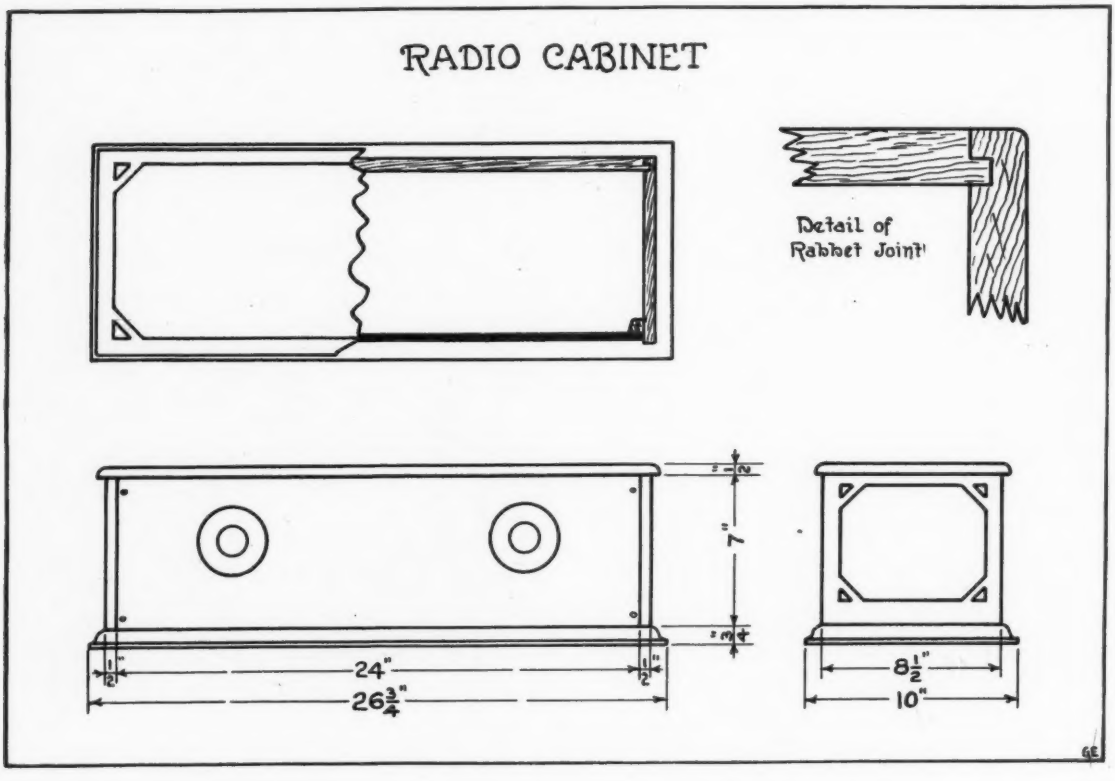
After the joints have all been fitted, glue the ends, back, and front rails together, clamp, and test with try-square. After the glue has set and the joints cleaned up, fasten the bottom on by means of long, thin screws. The top should be hinged to the back, using either tight-pin or loose-pin brass butts.

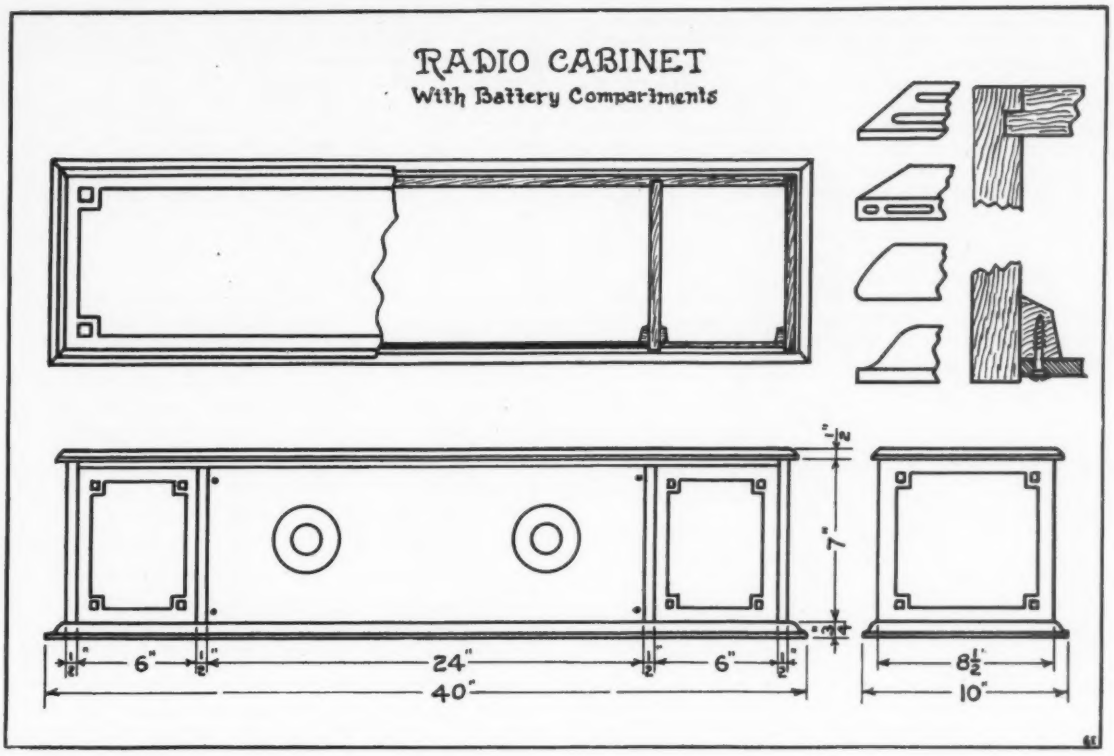
If the cabinet is to contain the batteries, the division walls of these compartments should now be fitted and fastened in place, and the doors made and hung. Small knobs and friction catches should be used on the doors. In fitting the bullet type of friction catch, the striker should always be fitted to the door, and the catch fitted to the frame.

The instrument panel may be fastened into the space provided by means of two oval-headed screws at each end of the panel as shown in the detailed section.

The simplest method of finishing is to sponge the cabinet with water to raise the grain. When dry, sandpaper thoroughly and apply water stain of the color desired. After drying 12 hours or longer, apply a coat of very thin shellac. Sandpaper, and apply a coat of wax, clear brushing lacquer, or varnish, as desired.

If a duo-tone finish is desired, the simple line design shown in the drawings should be worked in with a veining chisel or a motor-driven router. The cabinet is sponged,





dried, and sandpapered as in the first method. The entire cabinet is now stained with a light tone of the color desired. When entirely dry, the border and other accents are gone over with a slightly darker tone of the same stain. Apply a coat of thin shellac, then sandpaper as before. With a small brush fill the grooves, which separate the two tones, with a harmonizing color, using brushing lacquer. Finish with a coat of clear brushing lacquer or wax.

A very popular and novel finish, the brightly colored and quick-drying brushing lacquer finish, is very desirable if the color combination is selected with care, and in harmony with the other furnishings in the room. After thorough sanding, the cabinet should have two coats of thin shellac, sanding after each coat. The lacquer should then be applied according to directions on the can.

HOW WE CHOOSE PROJECTS

Marcus L. Burris, South High School, Youngstown, Ohio

It is encouraging to have a boy say, "I would like to make this," this being a drawing, a picture, or a description of a project that interests him.

The teacher should never turn a deaf ear to such a request if the job is worth while. If the student is not ready as far as ability is concerned, to attempt the job which he wants to make, he should be directed in making the necessary preparations.

About three fourths of the average class will be inclined to copy, having little or no initiative, no purpose other than to drift with the tide. They are destined to become parasites unless they can be inspired to employ what talent they have in working out their own problems and their own salvation.

Growth, we must remember, is a golden thread let down from above, not to pull us upward, but to afford us an opportunity to pull ourselves up just as high as we resolve to go. "Poor are the things we build, that build not us."

By an actual test, three fourths of the pupils found something they wanted to make, but not until they were flooded with suggestions.

The question was asked them, "Do you suppose anybody in this class could make a musical instrument?"

There were several boys in the class who play in the school orchestra, but the first to answer the question by action was a boy who loves music, but did not, up to that time, play any sort of an instrument. This boy was sent to interview a violin maker who gladly told him and showed him how to proceed. Then he was brought in touch with a repairman, who could provide him with the parts that could not be made in the school shop, such as strings and trimmings. The boy's parents became interested, as did all of his classmates.

PHOTOGRAPH OF PAUL SIMS WITH TWO MUSICAL INSTRUMENTS HE MADE UNDER THE DIRECTION OF MARCUS L. BURRIS, SOUTH HIGH SCHOOL, YOUNGSTOWN, OHIO

Thus things were started. Just now radio cabinets lead, some of them being very simple and some of them being advanced cabinet jobs.

Before beginning the actual jobs, time is taken to demonstrate the joinery, paneling, door and drawer construction, hinging, and finishing, that are to be employed. Following the teacher's demonstration, the students try their hands and their heads, their heads first.

It is a good rule never to allow the shop to be filled with big pieces. The better plan is to keep a representative piece of cabinetwork always in the making, at least one in each semester. This year, the first big piece was a gate-leg table; then a butterfly table, followed by a secretary. These pieces were outstanding examples of good design, construction, and finish. In this the students have an opportunity to learn by observation as well as by doing.

AIR-COOLED CUPBOARD

L. M. Roehl, Assistant Professor, Cornell University, Ithaca, N. Y.

The purpose of the air-cooled cupboard is to provide a place for keeping food at atmospheric temperature when ice is not at hand or not necessary. The back porch is a desirable place to put the cupboard.

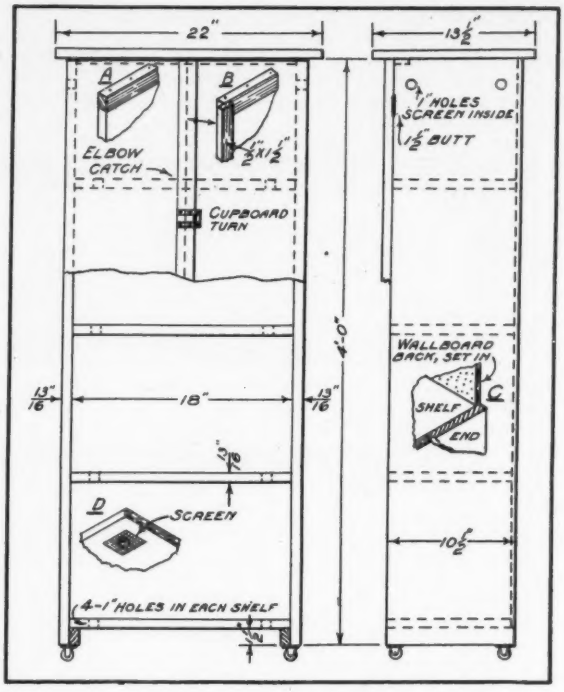
The design is simple so as to make the construction of the cupboard possible to those who do not have a large assortment of tools.

Any softwood may be used.

The shelves are fastened in place with 6d common nails. The bottom shelf rest is also fastened with the 6d nails which are driven from the outside and clinched. The top is made of two boards which may be joined with corrugated fasteners. Detail sketch A shows a way to construct the doors so that the boards will not warp. A piece of stock of the same thickness as the door, 1½ in. wide and as long as the width of the door is nailed with 10d finishing nails as shown. Detail sketch B shows a ½ by 1½-in. strip nailed to the front edge of the right door so as to cover the joint. The left door is held shut with an elbow catch which is fastened to the top of the top shelf. The right door is held shut by the use of a cupboard turn. The doors are fastened to the case with 1½-in. pin-butt hinges.

It will be noted in the detail sketch C that the shelves are made as much narrower than the sides as the thickness of a piece of wall board, and the wall board is nailed to the back edges of the shelves.

Circulation of air about the food is provided for by boring four 1-in. holes in the bottom board, and in each shelf, and in the side boards at the top. A piece of window-screen



AIR-COOLED CUPBOARD.

wire is tacked over the holes in the bottom on the under side, and on the inside of the holes in the side boards as shown in detail sketch D.

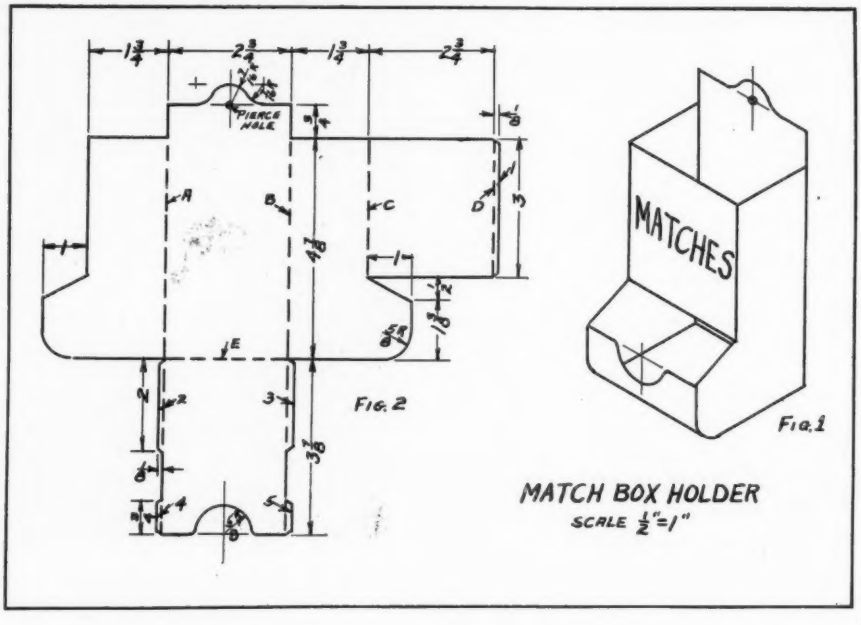
The box is finished with three coats of white exterior paint.

Four plate casters are placed under the box so that it may be moved about easily.

MATCH-BOX HOLDER

Alfred Grayshon, J. Cooke Junior High School, Philadelphia, Pa.

Numerous projects can be utilized in sheet-metal work in the school shops which teach the tool processes, and at the same time are attractive to the boy, and also have a utilitarian value. It is not at all difficult to find a boy who will want



to take home a match-box holder which represents some of his aptitude or skill in the metal shop. There are numerous types of match-box holders but they are invariably made of two or more pieces. This particular one is very neatly made of one piece and will hold a large box of matches.

The first consideration on this project is the correct alignment of the respective lines. Of course, the best way in laying out is to draw one set of parallel lines at a time, as in mechanical drawing, to avoid confusion. I also find that the isometric drawing of the object helps a great deal in giving the boy a visual image of the project being developed. The view of the possible result arouses an interest in him.

The first operation, making the layout, makes use of the boy's knowledge of mechanical drawing.

The second operation involves the careful use of the straight and curved shears in cutting the outline of the blank. The hole at the top also should be pierced at this time.

The third operation provides for the first forming, namely, the bending on the lines ABCD, bringing the sides up at right angles to each other. Lap I is now soldered to the side.

In the fourth operation bring up the bottom on line E to meet the bottom edges of the sides, and solder the laps 2-3.

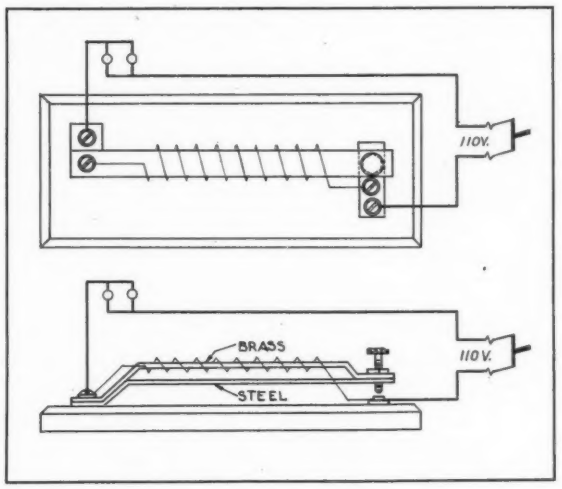
In the fifth and last operation, complete the forming of the bottom. Solder laps 4-5 and run some solder along the curved edge to finish it off.

After giving the match-box holder a good coat of metal enamel, the word "MATCHES" may be stenciled or lettered on the front to finish the project.

IMPROVED ELECTRICAL SIGN FLASHER

William W. Farley, Philadelphia, Pa.

Electrical sign flashers, as usually designed, have contacts which burn off or become welded together in a very short time. This is due to the arcing which takes place every time the lamps flash off because the circuit is completely opened to put out the lamps.



To overcome this arcing the circuit is never completely opened while the flasher is in use. Instead, the resistance wire wound around the flasher expansion strip is shunted by the contacts. When the resistance is thus "cut out" of the circuit the lamps burn brightly, but when the metal cools, the contacts are broken, thereby "cutting in" the resistance which dims the lamps. This dimming can be regulated by the amount of nichrome or other resistance wire used.

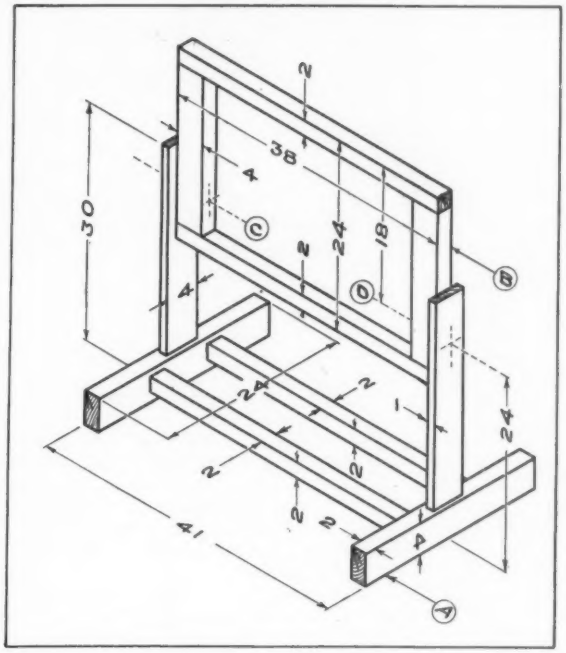
When "cold" the flasher contacts are open. As soon as the current flowing through the resistance wire heats the brass strip, it expands causing the contacts to close. This lights the lamps and stops the flow of current through the resistance wire allowing the brass to cool and contract, thereby separating the contacts which remain open until the brass strip is heated again. The number of flashes can be regulated by changing the position of the upper contact screw.

HOMEMADE ADJUSTABLE HURDLE

Charles W. Frost, Albany, Oregon

This is a very convenient type of an adjustable hurdle. The change from 3 ft. 6 in. for the high, to 2 ft. 6 in. for the low hurdle race, or vice versa, can be made in ten seconds, by simply loosening a couple of wing nuts in each hurdle.

The hurdle consists of two parts, A being a substantially built frame between the upright members of which the gate B is suspended upon ¼-in. bolts at the points C and D. These bolts are fitted with wing nuts.



Pinned mortise-and-tenon joints are used throughout. While these joints are a trifle more troublesome to make than the ordinary half-lap, or slip mortise-and-tenon joints, they are very much stronger and more sightly. The dowel pins should extend completely through each joint, and should be of birch or oak and ⅜ of an inch in diameter.

It is advisable to use "Monite" or other waterproof glue, because the hurdles are usually left on the athletic field all during the rainy springtime, which is also the outdoor track season. Apparatus fastened together with ordinary glue, when thus exposed to the weather, is prone to fall apart within a few months.

All hurdles should be given two coats of house paint as a protection against the weather, preferably white or some color easily distinguishable by approaching runners.

List of Material

4 pc. 2	x 4 x 24	
4 pc. 2	x 2 x 41	
2 pc. 1	x 4 x 30	
12 pc. ⅜	x 2	Dowel
4 pc. ⅜	x 3½	Dowel
2 Carriage bolts	¼ x 6	
4 Washers		
2 Wing nuts		

CYLINDERS FIVE AND SIX MISFIRE

Ray F. Kuns, Cincinnati, Ohio

Little things can cause much trouble. The gasket shown in Figure 1 broke between cylinders 5 and 6 at the point A. Naturally, compression leaked from one cylinder to the other and there was trouble. Drawing the head tight did not cure the trouble. When 6 was firing, the exhaust gases blew into cylinder 5 and vice versa. Intake was disturbed since the gases would blow into the intake line at times. An accident of this kind may not happen often but it is worth knowing about. It is hard to locate, in fact it can only be suspected

and the head must be removed to prove it. The longer it is allowed to continue the larger the hole will grow.

Figure 2 shows another gasket which gave similar trouble. It developed at the end of a day of hard driving. The local garage could not furnish a gasket, so a repair was made to enable the car to proceed.

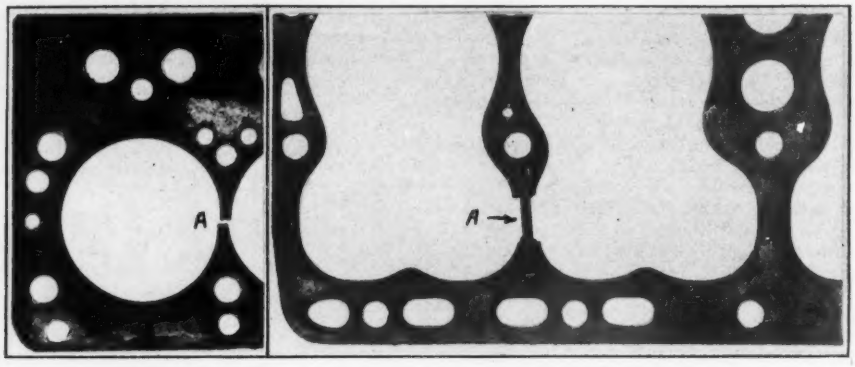


FIG. 1. THE BROKEN GASKET AT "A" CAUSED MISFIRING

FIG. 2. SHOWING A ROAD REPAIR OF A DAMAGED GASKET

The repair is shown at A. A small piece of copper tubing was cut from the vacuum tank and flattened out. It was then filed down until slightly thinner than the gasket which was notched out to receive it as shown.

The head was reassembled and clamped down tight. The picture was made when the gasket was removed after traveling 1500 miles.

BENCH VISE

John Rothe, Continuation School, Rochester, N. Y.

The small swivel-type bench vise described herewith, was designed specially for the toolmaker.

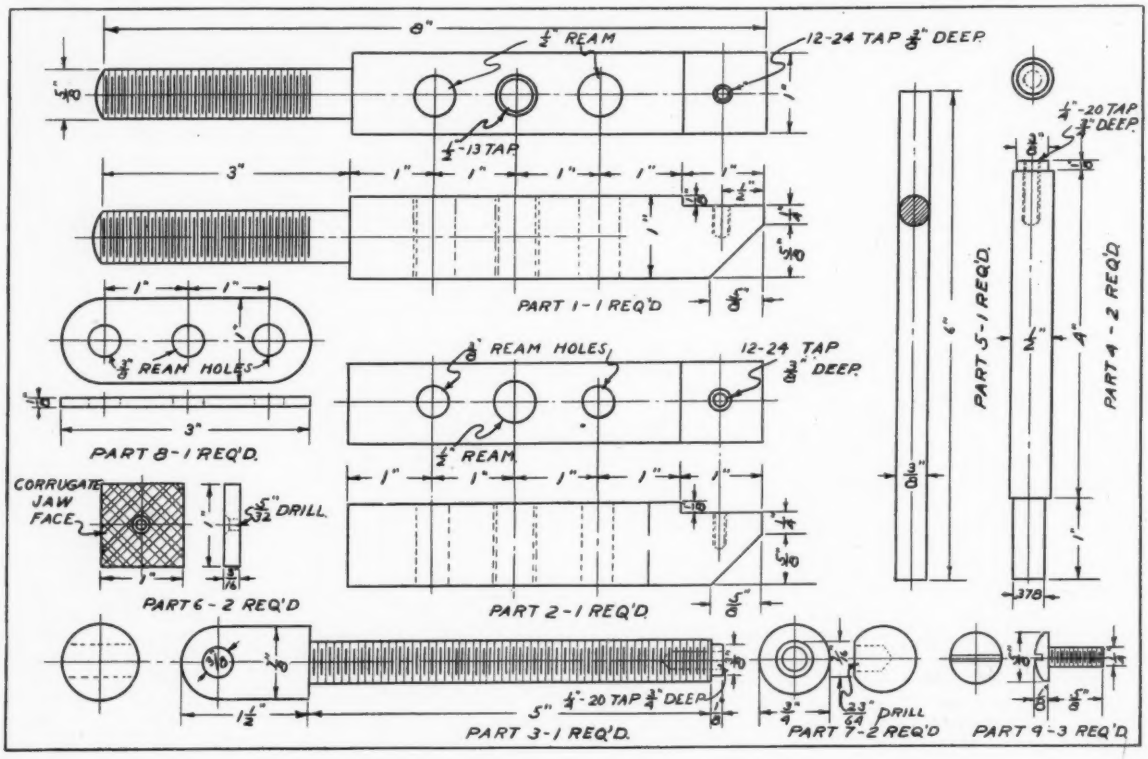
Toolmakers often have fine gauges to file and fit, and the heavy vise on the bench is too clumsy and rough for the parts. Then too, this small vise is just the kind that is wanted for small work at home or in the mechanical laboratory. Its construction is quite simple, and it can be made by any first-year boy starting in a junior high or part-time-school machine shop.

The frame and jaw are made of 1-in. square cold-rolled steel, and they are notched on the inner-top edges for jaw plates as shown. The jaw plates are made of 1 by 1 by ¼-in. cold-rolled steel and are casehardened.

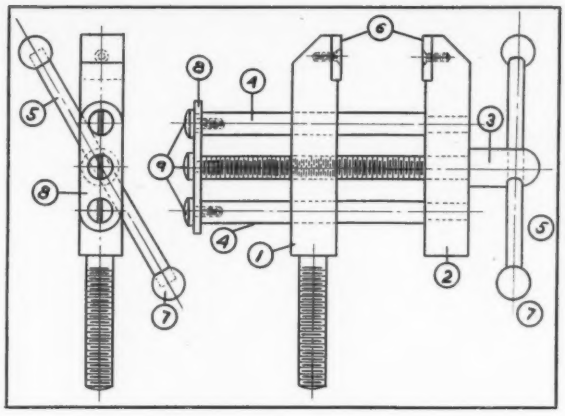
The long jaw is turned down on its lower end to fit the holes in the washers. These are made 1¾ in. in diameter, ¼ in. thick, drilled and reamed ⅝ in., and faced.

The extension of the leg is then threaded and fitted with a wing nut, which clamps up tight against the under washer. A hole must be drilled in the bench at the most suitable place for the vise.

The frame, jaw, and end plate are clamped in the vise and all three of them drilled together for the two guide rods. These rods are turned down on one end to fit the holes in the end plate, and on the other end to a press—fit into the jaw. A screw of ½-in. diameter, 15 threads per inch, is used to



DETAILS OF BENCH VISE



ASSEMBLY OF BENCH VISE

operate the sliding jaw of the vise. After the screw has been fitted, drill and tap its end for the thrust screw.

If care is taken in the construction of this vise, a handy and durable tool will be the result.

PIANO BENCH

Charles B. Thomson, Quincy High School, Quincy, Mass.

The piano bench described herewith was designed with the idea of getting away from the lift cover. It has two drawers which pull out from the ends in which the music can be kept.

The bench rails are half-lapped onto the legs. This is done to make the bench as narrow as possible for reasons of design. A groove 3/8 by 1/2 in. is cut in the lower edge of the rails for the runner which is fastened to the drawer as shown in the illustration.

The drawer fronts are made to lap over the legs. The end rails are mortised into the legs, and the top is fastened to the rails by means of screws put through the rails at a slight angle. The usual method of drawer construction is used. The bench may be made of mahogany, given a coat of stain, filled with paste filler, and oil finish.

Bill of Material

1 pc.	7/8 x 19	x 36	Top
2 pc.	7/8 x 3	x 31	Rails
1 pc.	1 x 13	x 31	Bottom
4 pc.	1 3/8 x 1 3/8	x 20	Legs
4 pc.	7/8 x 2	x 16	Sides
4 pc.	7/8 x 2	x 12	Ends
1 pc.	7/8 x 2	x 12	Stop

THE IDEAL CHILD'S SET

Armand J. LaBerge, Bryant Junior High School, Minneapolis, Minn.

Table and Chair

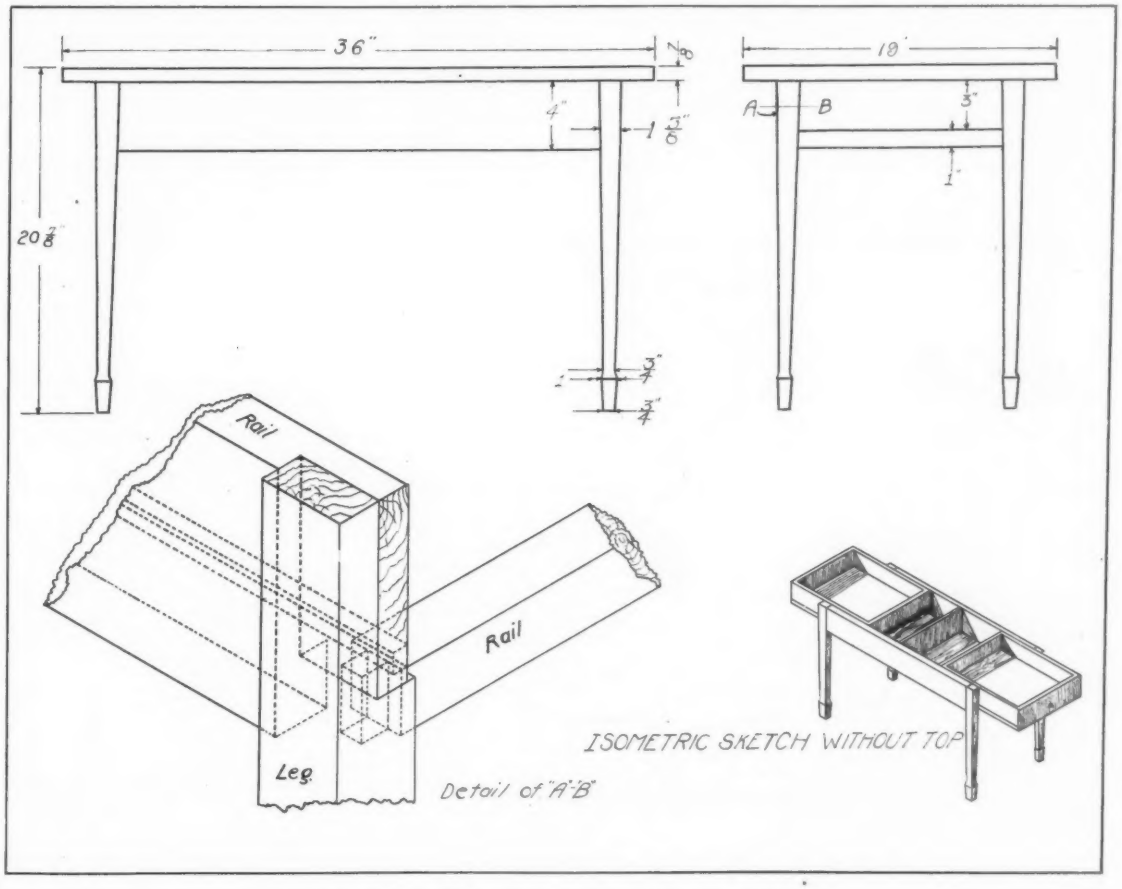
The table and chair illustrated in this article make very interesting and novel problems for the woodworking shop.

They are simple in design and construction, although very pleasing in appearance. The type of construction used renders both table and chair very substantial.

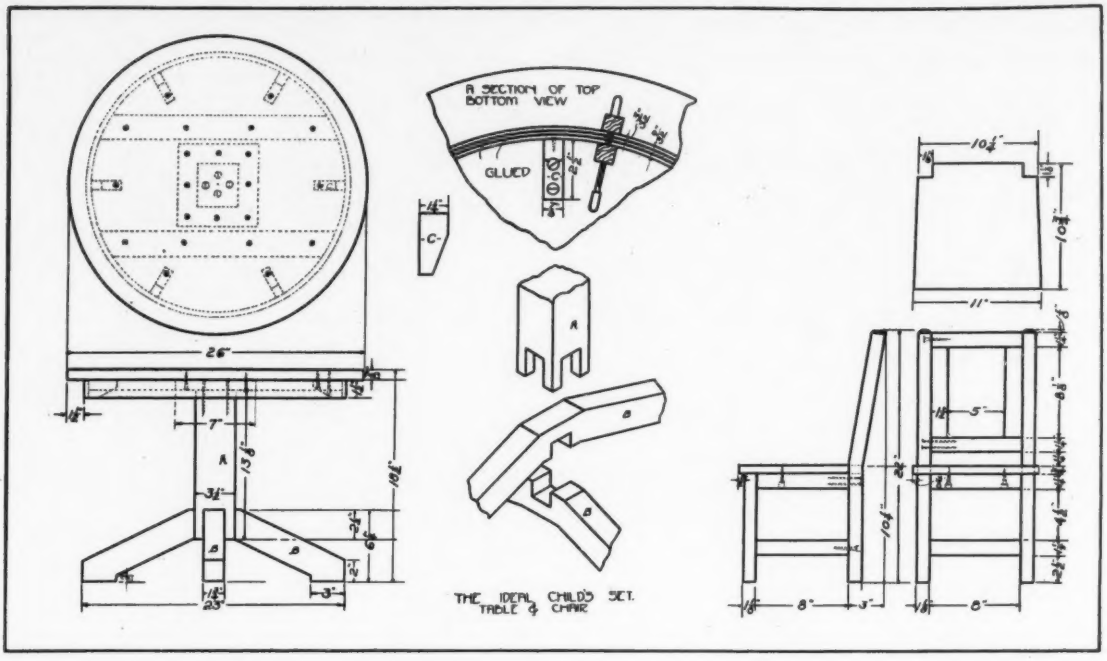
The drawing gives all necessary dimensions, but the following explanation will prove helpful.

White pine has been found very satisfactory for use in the construction of both table and chair.

The rail of the table is built up of a strip of white pine 3/32 in. thick, 1 1/4 in. wide, and 10 to 12 ft. long. In building the rail, it is better to fasten one end of the strip to one of the blocks, as shown at C, and then bend the strip around the remaining five blocks, thus forming a perfect circle. The



PIANO BENCH DESIGNED BY CHARLES B. THOMSON



strip is fastened to the blocks with screws the first time it is bent around the form. In winding or bending the strip the second and third time around the form, glue is applied. Hand screws are used to hold the layers together while the glue is drying. All parts of the table are fastened together with screws as shown in the illustration.

The chair is very simple in construction, only the plain butt joints being used. All parts are fastened together with screws and finishing nails.

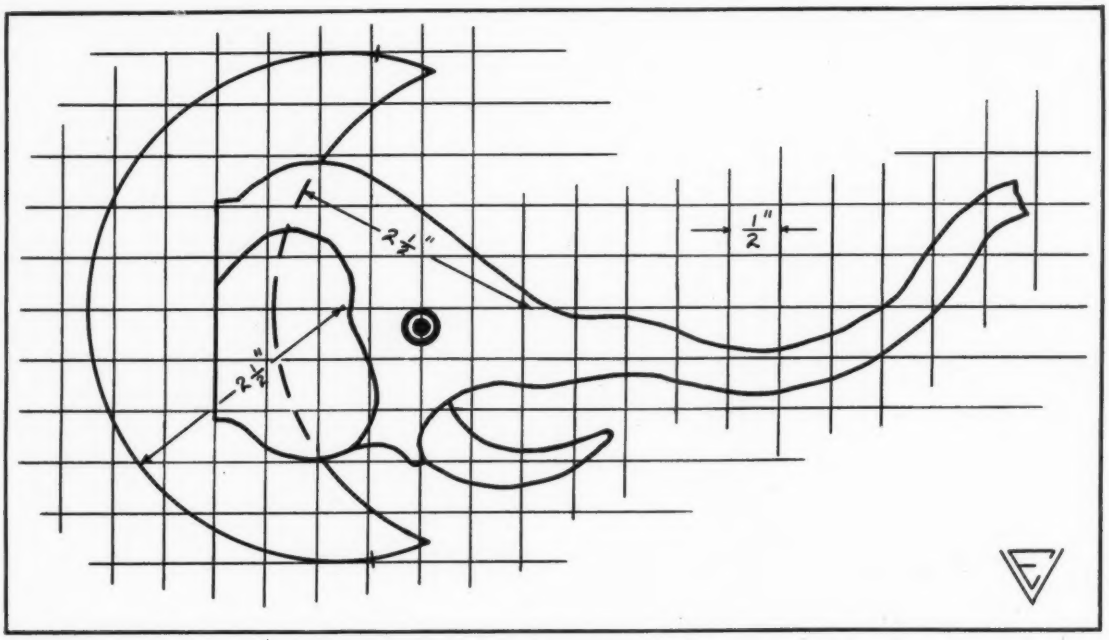
Although any desired finish may be used, a white-enamel finish makes a very satisfactory and pleasing finish for the project.

ELEPHANT TIE RACK

Edward B. Vicine, Newark, N. J.

Most coping-saw problems consist of toys, but some schools do not allow toys to be made. To the more practical-minded boy, such playthings have long since passed out of his existence. The project described herein, therefore, appeals to the boy, because it is for his own use. The Elephant Tie Rack is unique, simple, and useful.

It is made of ¼-in. three-ply stock with the edges well rounded. The head is fastened to the half-moon with a ⅜ by ¾-in brass hinge so it can be folded back against the wall. The moon was painted orange, the elephant gray (both sides), tusks white, and the eyes black, also the outline of the ears.



ELEPHANT TIE RACK DESIGNED BY EDWARD B. VICINE

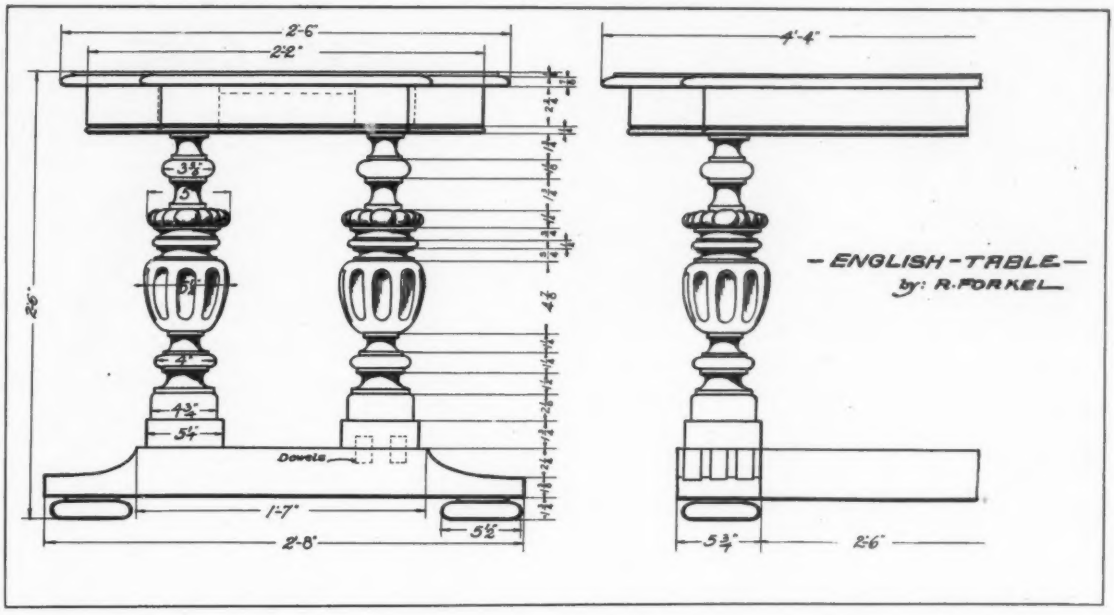
ENGLISH AND ITALIAN TABLES

R. Forkel, The School of Industrial Arts, Trenton, N. J.

The accompanying illustrations show English and Italian tables which were made by advanced students of the School of Industrial Arts, Trenton, N. J.

The English table shows great massive baluster legs which have been modified somewhat to bring the decoration within the ability of the student. The table is constructed of oak, fumed, filled, and waxed.

The Italian table is a very fine problem for the lathe. A little carving applied on the legs and on the stretcher improves the appearance very much. This table is constructed of mahogany, stained, filled, varnished, and rubbed.



In attempting work of this kind, a knowledge of free-hand drawing is a great asset, and the student must be able to do accurate work in a workmanlike manner. Then, too, it is necessary to possess a knowledge of design and of the characteristics of period furniture.

It is a very easy matter to spoil the effect of the work, if the design and drawing are not first prepared.

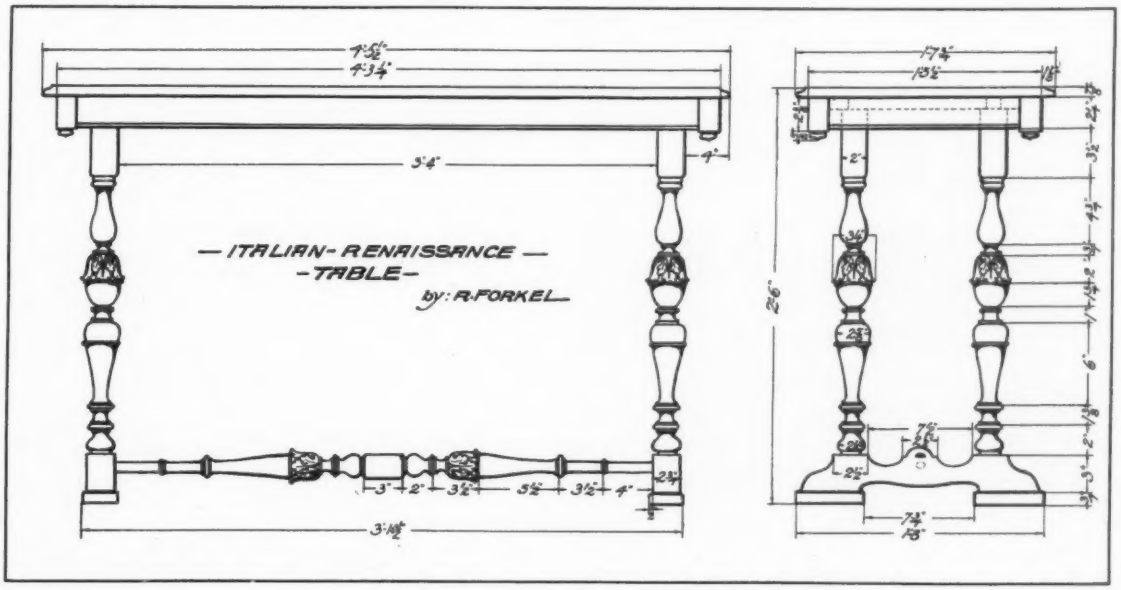
The construction and workmanship may be of the very best, but if the design is faulty, the value of the work will be very much decreased. The same holds good of wood turning. There may be a number of good wood turners, but the one who is able to draw will produce work which shows more graceful lines.

SOLDER-UP WEEK

Margaret Romer, San Diego, Calif.

The technical department of the Memorial Junior High School of San Diego, gives a series or cycle of 10-week tryout courses in the various shop subjects, to the boys of the seventh grade. The purpose is to give the boys a chance to "find themselves" or to see what they can do best.

The last week of this course in sheet metal, is termed the "solder-up week." Ostensibly it serves as a test to find out what the boys have derived from the course. The school officials however, also use this week to call attention of the



SOLDER-UP WEEK. INSTRUCTOR, EARL F. LUCAS, IN CENTER

Notice outline of dummy policeman in background. He is made of sheet metal on two sides of a wooden frame. He was made in the shops and will be painted in the art department and then placed on the nearby boulevard to warn motorists that they are approaching a school. This is the second one that has been made. The first one has been in successful use for about a year.

patrons of the school to what is being done in the school shops. The solder-up week is advertised in all of the city papers and in the school paper during the week previous. The announcement also is made to the entire student body. The students and the neighborhood are invited to bring in any old pots, pans or kettles, or anything that can be mended with solder, and the repairing is done free of charge. Because everyone in the district knows about it, pots and pans usually pile up in the school, until the latter looks like a junk shop.

Is this week a success? If you could see the youngsters running toward the school with handleless teakettles and pans the previous week, and then see them joyfully carry home the repaired articles, there would be no doubt in your mind that solder-up week is a success.

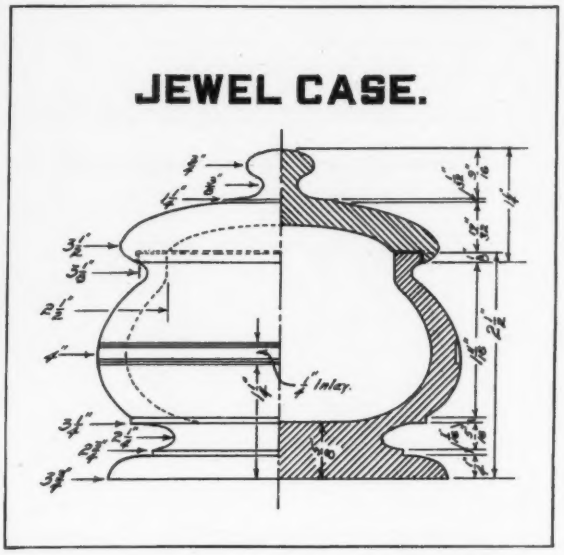
A TURNED JEWEL CASE

Paul N. Wenger, Supervisor of Manual Arts, Greenwich, Conn.

The jewel case, as shown in the accompanying photograph and drawing, can be made very successfully by the manual-training students. It has one distinct advantage over most of the jewel cases, that is, that the base is thick enough so that a ½-in. screw can be used to fasten it to the chuck.

TURNED JEWEL CASE DESIGNED BY PAUL N. WENGER

Therefore it is not necessary to glue it upon another piece for turning, which, in itself, make the project less difficult. The design is simple and yet very attractive. It allows for ample space inside the case.



This project may be made with, or without, the inlay. However, the inlay greatly enhances the appearance of the object and, if possible, should not be omitted. As the diameter for the inlay is 4 in., it may be inlayed without great danger of breakage. The stock for the lower part should be about 4¼ in. in diameter and about 2⅝ in. thick. The inlaying is best accomplished if it is done as soon as the stock is turned to the proper height and the proper diameter. The inlaying process is as follows: Cut a groove so as to fit the inlay; cut the inlay so that its length is ¼ in. greater than the circumference, and taper each end so as to form a ¼-in. seam; place glue on the inlay and in the groove; properly place the inlay in the groove; tighten a hand screw across the diameter so that one jaw holds the seam in place, and allow sufficient time for the glue to dry.

After the inlaying is finished, the inside of the case may be shaped and sanded. In shaping the outside, care must be taken so that the tool does not cut through the inlay. The outside should be carefully sanded; and should be given a natural finish so that the inlay will not become colored.

The stock for the lid should be 1¾ in. thick, and 4 in. in diameter. In case it is made out of expensive material, the stock should be 1¼ in. thick and should be glued to a ½-in. piece of cheaper wood. After the inside of the lid is turned to design, another piece should be turned so as to fit the ⅛-in. inside rim. If a tight fit is made, the outside of the lid may be turned, sanded, and finished without any danger that it will fly off the chuck. The lid should fit loosely upon the case. Felt may be glued over the base, if it is desired.

UTILITY SCOOPS

Alfred B. Grayshon, J. Cooke Jr. High School, Philadelphia, Pa.

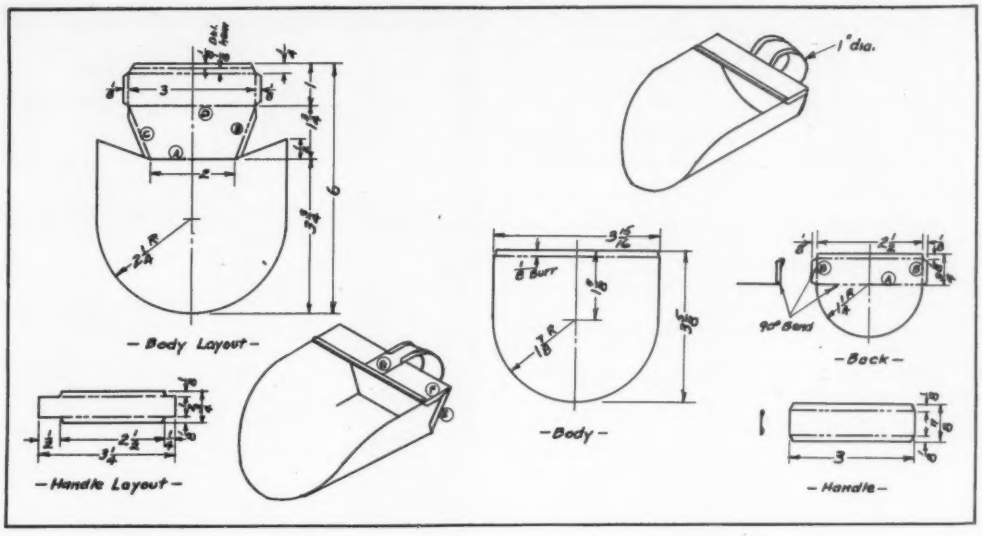
An article which has a general usefulness in the kitchen or pantry of the home is the scoop. It can be very easily constructed as a project in the junior-high-school metal shop and used to illustrate sheet-metal layout and formation. As a project, the scoop has a *practical* as well as a *utilitarian* value.

The two scoops shown in the drawings are different in the manner of their construction. A typical analysis of the procedure for each, follows:

Scoop No. 1

Material Required:

1 piece tin, 4½ by 6 in. for the body.
1 piece tin ¾ by 3¼ in. for the handle.



SCOOP NO. 1 SCOOP NO. 2

Operations:

Body

1. Make an accurate layout of the body on the tin.
2. Cut out carefully, following all solid lines.
3. Fold a double hem on the edge indicated.
4. Bend on line A, bringing in the sides by hand at the same time. Avoid battering the tin with the mallet.
5. Bend up the lap seams B and C. (Use the mallet for this.)
6. Solder the lap seams B and C, as shown at E.
7. Bend on line D to form over the top.
8. Bend down the side seams as at F. (Use the mallet for this.)
9. Solder the top side seams in place.

Handle

1. Layout.
2. Cut out and notch.
3. Fold the single hems on the sides.
4. Solder the ½-in. end to the top of the body in a central position as shown at G.
5. Form the rest of the handle circular.
6. Solder the remaining end in place on the back of the body.

Remarks:

Polish thoroughly with whiting.

Why solder one set of lap seams before shaping the next set?

Scoop No. 2

Material Required:

1 piece tin 3⅝ by 4 in. for the body.
1 piece tin 2 by 2¾ in. for the back.
1 piece tin ⅞ by 3 in. for the handle.

Operations:

Body

1. Layout.
2. Cut out.
3. Form into a semicircle.
4. Burr the edge toward the inside.

Back

1. Layout.
2. Cut out and notch.
3. Fold the single hem.
4. Make right-angle bends at A and B.
5. Solder in place to the burred edge of the body.

Handle

1. Layout.
2. Cut out.
3. Fold the single hems on the sides.
4. Form into a circle.
5. Solder in a central position on the back of the body.

Remarks:

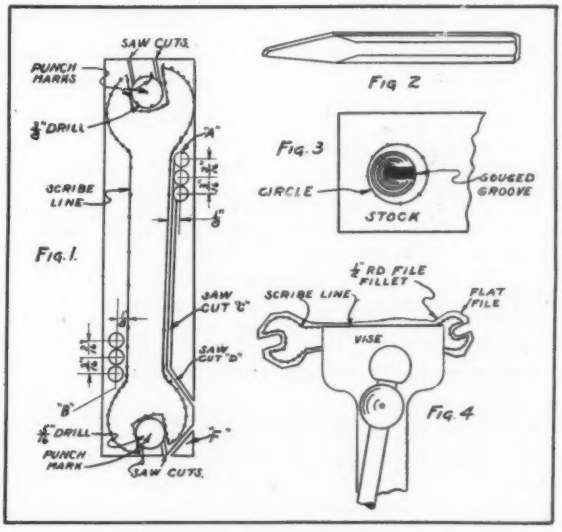
Polish thoroughly with whiting.

Would it have been better to burr the circular edge of the back piece instead of the body? Explain.

THE END WRENCH AS A BEGINNING BENCH PROJECT

C. C. Stevason, Central Junior High School, South Bend, Indiana

Frequently the machine-shop instructor has considerable difficulty choosing a bench project suitable for the beginning boy, one which will hold the student's interest and at the same time gives him sufficient introductory training. The wrench described herewith has been found quite satisfactory as a first project. Following, is the way the job is outlined on the students instruction sheet. This sheet is combined with a demonstration, individual instruction, and questions with answers, to accomplish the teaching job.



DETAIL OF END WRENCH NO. 723

Material: 1⅛ by 1 by 4½-in. tool steel.
Time Required: Fourteen periods.
Note: This is a real toolmaker's job and must be done accurately. You may be justly proud of it if you are careful to do neat work.
Caution: Use copper plates in the vise to hold your work. Do not do any of this work on the emery wheel.
Procedure:

1. Draw-file and polish one side of the stock.
2. Apply a thin coat of copper sulphate.
3. Get a template from the instructor.
4. Clamp the template to the coppered side of the stock with a toolmaker's clamp.
5. Mark the outline of the template on the stock with a sharp scriber.
6. Punch-mark the scribed line as shown in Figure 1 with a sharp punch.
7. Layout the ⅜-in. and ⅞-in. circles with a punch and dividers. (Fig. 1.)
8. Have the instructor check your work.
9. Start the ⅜-in. drill until half of the point is in the metal, then raise the drill to see if the drilling is in the center of the circle. If not, use the narrow, round-nose chisel shown in Figure 2 to bring the drill over to the true center. (See Fig. 3.)
10. Drill a little more and repeat Step 9. When the drill is going central, drill on through.
11. Saw the ends as shown in Figure 1.
12. Scribe the lines A and B and punch-mark for the holes. (Fig. 1.)
13. Drill the ⅞-in. holes on lines A and B.
14. Chisel out the openings, if necessary, at A and B to start a hack-saw blade in.
15. Saw the slot C, being careful to keep at least 1/32 in. away from the scribe line.
16. Remove the material from the sides by sawing as shown at D.
17. Repeat the above on side B.
18. Saw off the four corners as shown at F. (Fig. 1.)
19. Remove the copper faces from the vise.
20. Carefully clamp the work as shown in Figure 4. Do not clamp the vise too tight as it will mar the work.
21. Select a good bastard-cut hand file and file almost down to the vise. Finish with a smooth-cut hand file. File straight across. Do not permit the file to touch the vise any more than necessary as this dulls the file.
22. Use a ½-in. round file on the fillets and flat files on the convex part of the jaws.
23. File the opposite side of the wrench.
24. Have the instructor check your work.
25. Place the work in the vise, using the same method as described in the foregoing, and file the straight part of the opening at the end. Secure ⅜-in. and ⅞-in. gauge blocks from the instructor and make the openings fit these.
26. Use small and large round files on the back of the opening.
27. Polish the job all over with emery cloth.
28. Have the instructor grade your work, and ask him to harden and temper the wrench.

Questions

1. What does the number 723 indicate?
2. What sizes of cap screws and nuts does this wrench fit?

WHY DOESN'T THE GENERATOR WORK?

R. F. Jennings, South High School, Minneapolis, Minn.

If the generator stops charging there is something wrong internally, and the first thing to do is to remove it from the engine, as shown in Figure 1. On some makes of cars, a plate can be placed on the engine where the generator came off, the end of the generator wire taped to prevent grounding, and the car can be used while the generator is being repaired.

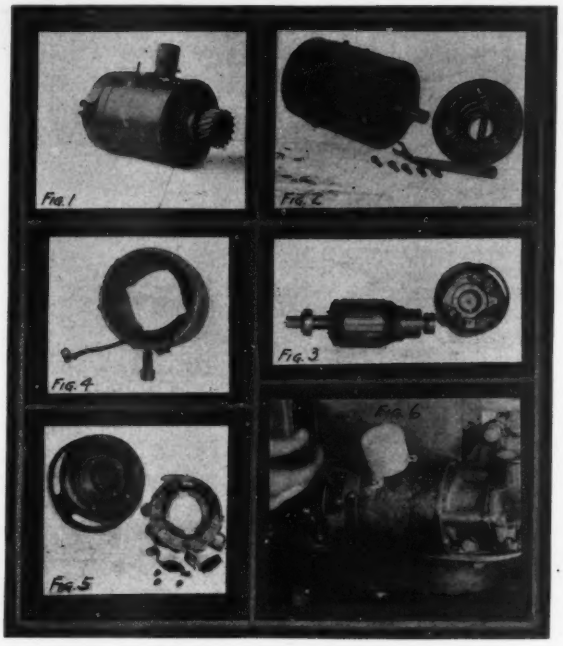


Fig. 1 shows the generator ready for dismantling.
Fig. 2. Gear and drive end plate removed.
Fig. 3. Armature and commutator end plate.
Fig. 4. Field frame assembly showing pole shoes, coils and leads.
Fig. 5. Commutator end plate with brush ring removed.
Fig. 6. Generator back on car, showing third brush location.

After removing, the first step is to place punch marks on the end plates and field frame to insure correct assembly later as shown by the arrow in Figure 1.

After marking, the next step is to dismantle completely for cleaning, putting all parts in a tin pan. The gear can be removed with a puller after the lock pin has been driven out, although the removal of the gear is not absolutely necessary in most cases. Next, the drive end plate can be removed as shown in Figure 2, exposing the armature. The armature, shown in Figure 3, can now be pulled out. The commutator end plate, also shown in Figure 3, can next be removed after disconnecting the two field leads from the brush holders. The field frame containing the field coils and pole shoes is shown in Figure 4.

It is best to remove the brush ring from the commutator end plate as shown in Figure 5, although this is not always done. Before removing, however, light punch marks should be made to insure correct assembly.

Now every part can be thoroughly washed with a bristle brush in gasoline and blown dry with air.

The next step is to test thoroughly for electrical and mechanical troubles. A growler, 110-volt test lamp, phones, ammeter, and compass are all the test equipment necessary. The following troubles should be tested for:

1. Thrown solder on commutator.
2. Burned insulation on armature windings.
3. Loose bars in commutator.
4. Shorts in armature windings (use growler).
5. Opens in armature windings (use growler and phones).
6. High mica on commutator.
7. Grounds in armature (use test lamp).
8. Grounded brush holders.
9. Weak spring tension on brush holders.
10. Broken field leads.
11. Shorted field coils (use battery and ammeter).
12. Open in field coils.
13. Grounded field coil.
14. Reversed polarity in field coils (use battery and compass).
15. Worn bearings.
16. Worn-out brushes.
17. Armature rubbing on pole shoes.

After locating the trouble and remedying it, either by repairing the defect or by replacing defective parts, the commutator should be turned down with a light cut in the lathe, just enough to "clean." The mica between the commutator bars should next be undercut $\frac{1}{32}$ of an inch with an old hack-saw blade dressed down for the purpose. The commutator should be smoothed after undercutting with 6/0 sandpaper. Never use emery. After vaseline is applied to the ball bearings, the job is ready for assembly. It is nearly always advisable to install new brushes.

In assembling the generator, all but $\frac{1}{64}$ of an inch end play should be removed from the armature shaft with thin washers.

Some brushes will fit the curve of the commutator very well, while others require fitting by tacking a strip of fine sandpaper on the commutator with a small amount of glue and "sanding in." It is important that all traces of glue be removed from the commutator.

After assembling, it is necessary, on generators with a movable brush ring, to move the ring to neutral brush position or place of sparkless commutation. To do this, the generator should be motorized with the third brush lifted. The brush ring should then be shifted while the generator is running until rotation stops. Then the brush ring should be moved a trifle until the generator will motorize when given a start by hand. It should rotate in the direction it will be driven as a generator. It should not motorize without the start.

Now all screws can be tightened and the third brush brought into contact with the commutator. The generator should again be motorized and it should now start readily without help, turning slowly in the direction it is to be driven on the car. If it motorizes in the opposite direction, the field leads have been reversed and should be changed around.

Now the generator is ready to be tested. If testing equipment is available, the generator can be given a test run and the charging rate set by moving the third brush. If no testing equipment is available, the generator can be bolted back into position on the car and the charging rate can be adjusted. The third-brush nut or locking device should be loosened as shown in Figure 6 and the third brush shifted while the engine is running until the ammeter on the instrument board indicates the desired charging rate.

Any generator of the common third-brush type can be quickly examined for trouble and repaired by the foregoing procedure.

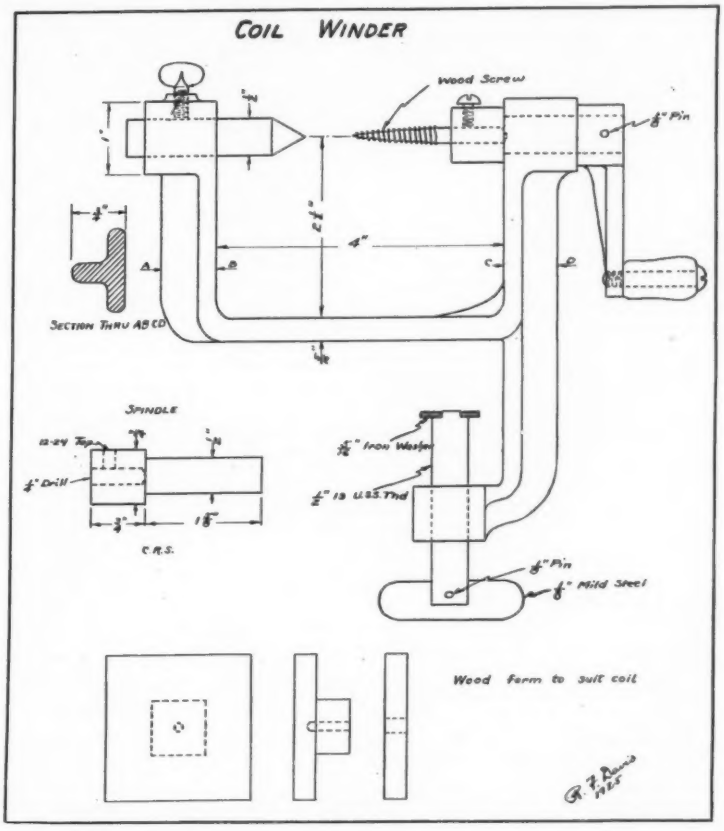
A COIL WINDER

R. F. Davis, Hibbing Junior College, Hibbing, Minn.

In junior-high-school electrical problems, it is frequently necessary to wind small coils, and the instructor usually casts about for some sort of device to use as a winder, and finally makes one of wood. We were using wooden winders in our junior high school but finally became exasperated at the constant breakage of the wood parts, thus the more substantial winders described herein were made up. They are easily made, and while not exactly things of beauty, nevertheless, they will be a joy forever.

The pattern for the frame casting is split through the stiffening web. The crank pattern is a one-piece block whittled to shape. Our castings are of aluminum, but iron is quite suitable and much cheaper.

The machine work on the frame consists of the removal of the burrs, and the drilling and tapping of a few holes. If a really nice job is desired, the spindle holes may be reamed with a half-inch reamer. The crank is completed with the drilling of two holes. The crank handle is made from a short length of birch dowel, with a hole drilled through for the screw which is riveted into the crank to prevent it from working out.



The two spindles are made from cold-rolled steel. The hole in the spindle on the crank end is shown with a wood screw projecting. This is very handy, as the end of the form is supported and held by this screw, and the boy can remove and tape one coil, while a second boy uses the winder.

Ten winders will serve very nicely for a class of twenty boys if twenty coil forms are made up.

The feeling of satisfaction which you will have when you throw the old wooden winders into the junk box, will more than repay you for the time spent in constructing a permanent set of coil winders.

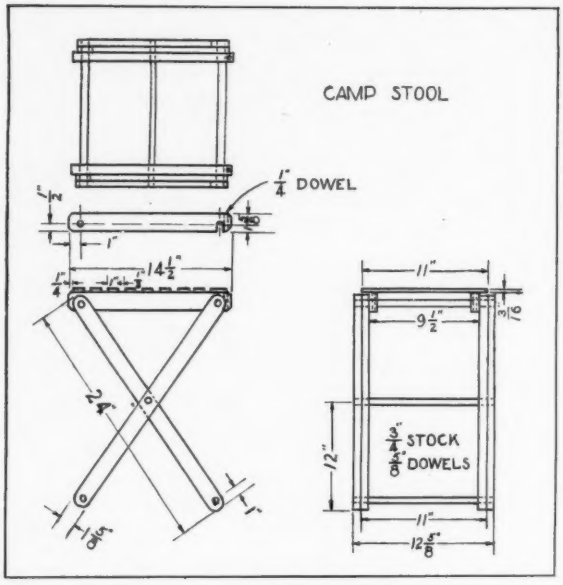
CAMP STOOL

Roger S. Houston, West Junior High School, Arlington, Mass.

This camp stool has met with success in all the grades of the junior high school. It makes an excellent project for beginners. It is useful in the household either as a stool or as a stand, and it is inexpensive to construct.

The problem furnishes excellent material for the development of the boy's constructive imagination. It also teaches the boy the value of accurate measurements.

The work may be carried on as a production problem. The jobs are arranged as in a factory, each boy having one operation at a time. This method keeps the standard of work high.



If the boy has only one thing to consider, he does better work and goes ahead more rapidly. The factory plan gives the boy enough repetition to really make him competent in the handling of tools. Work produced under this plan is usually of a better quality than that found in individual projects. Group instruction is easily handled this way.

Softwood is more desirable for beginners, but hardwood makes a much better stand. The finish of this article depends upon the use to which it is going to be put. The brilliant colors along with the green and natural finish, may be all used with good results.

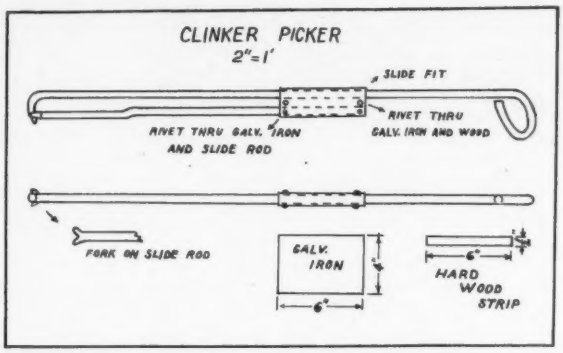
CLINKER PICKER

Dan H. Ohlinger, Detroit, Michigan

This is something to eliminate dad's trouble when furnace clinkers fail to balance on the poker. By moving the slide rod back and forth, any size clinker may be gripped and lifted out of the fire box. It may also be used as a poker when the slide rod is in an upright position. The picker can be made of a broken Ford truss rod, or of regular ⅜ to ½-in. round stock.

Procedure:

1. Cut a rod about 4 ft. long. Grind to a point at one end and form a 2-in. hook.
2. Bend a handle on the other end.
3. Cut a rod 2 ft. long, split on end 1 in. back with a hack saw and form a hook.
4. Cut spacer of hardwood 6 in. long and ½ in. square.
5. Cut a piece of medium-weight galvanized iron 4 by 6 in. and bend around both rods and wood, drilling holes for rivets as shown in the illustration. This makes a sliding fit



along the handle rod while the slide rod is riveted tight. The hardwood strip acts as a spacer to keep the rods apart, and give a body to bend the galvanized iron around.

ALL-METAL TOY AUTO TRUCK

Francis W. Klay, Smith Vocational School, Northampton, Mass.

IX carcoal tin or furnace tin, can be used for this project. The structural details, as given in the following, are lettered in the order in which they can be easily and conveniently assembled.

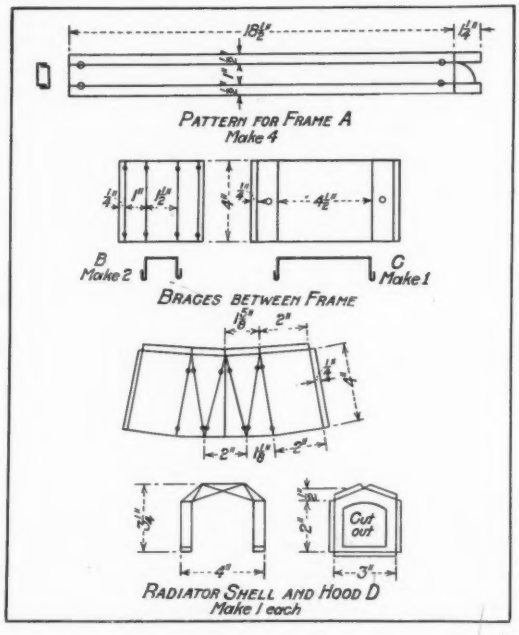
The patterns for the frame are marked A and are laid out in four sections as shown. Bend up a ½-in. flange square, and roll the ends to fit the curved spring. Put the two channels together as shown, and solder along the edges.

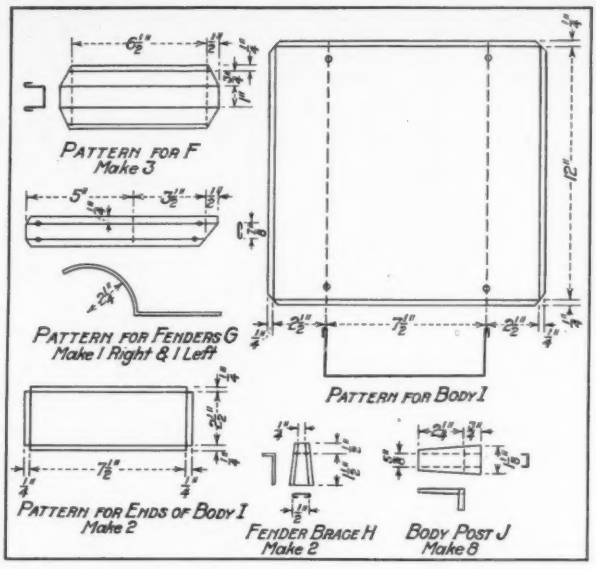
Lay out the pattern for the two braces marked B. Hem ¼ in. one way, and make the square bends in the opposite direction to form the channel.

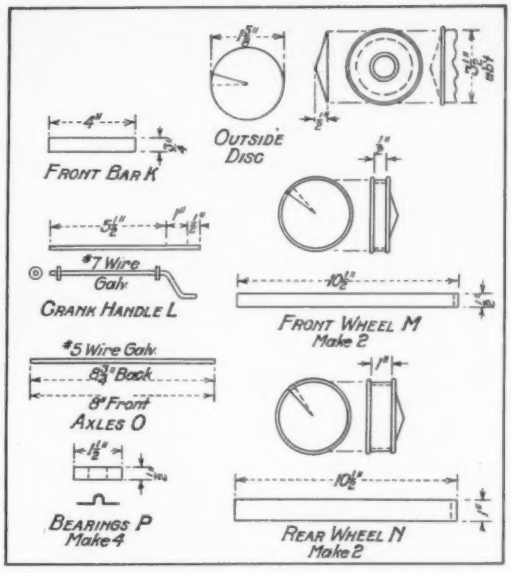
Lay out pattern for C and form up as in the case of pattern B. Make one only. Punch two $\frac{3}{16}$-in. holes as shown.

Next assemble the frame, complete, by laying two channels on the ½-in. side on a flat surface, such as the bench plate, placing the two ends in a steel square to hold the form in its proper place. Place the three channels marked B and C in their place, as shown in the assembly drawing. Weigh them down and solder.

Next, lay out the pattern for the radiator shell and hood cover marked D. In laying out the radiator shell, add ⅛ in. for lap when cutting out the hole in the center. On the inside,







place a piece of very fine brass or copper mesh, such as is used for screening, and press together to make the mesh diamond shape like a honeycomb radiator. Then solder on the inside.

The hood cover is laid out as shown, with a ¼-in. lap added on three sides. Hem up, and turn another bend opposite to fit the radiator shell, and solder to it. Solder the hood to the frame, ¼ in. back of the front brace C.

The next step is to lay out the patterns for the cab marked E. This is made up of three parts. The first part is the pattern for the back, sides, and top, all in one piece. Cut out the window in the back and punch any size hole in the side, near the top as shown.

Notch the flange of the top to roll over to fit the curve on the sides. Then lay out the front part and cut out the hole for the windshield and form as shown. Solder it in place. Lay out the seat, bending it up and soldering it to the inside of the cab. The cab, when finished, will be the same width as the frame. Solder the cab marked E.

The pattern of the crosspieces of the body of the truck F is the next to be laid out. Make three. Hem a ¼-in. edge on each side. Then bend the ¾-in. flanges in the opposite direction. Solder these pieces across the frame as shown in the assembly drawing.

The front fenders G are next laid out. Hem both edges ¼ in., and after bending and rolling as shown, solder them to the frame.

Lay out the two fender braces H. Hem both edges ¼ in., bend as shown, and solder to the side of the frame and to the underside of the fenders.

Lay out patterns for body I. Hem all four edges ¼ in. Then bend the sides in the opposite direction. Lay out the two ends as shown, hem up to the edge, and bend the other three laps square in the opposite direction. Solder the ends into place.

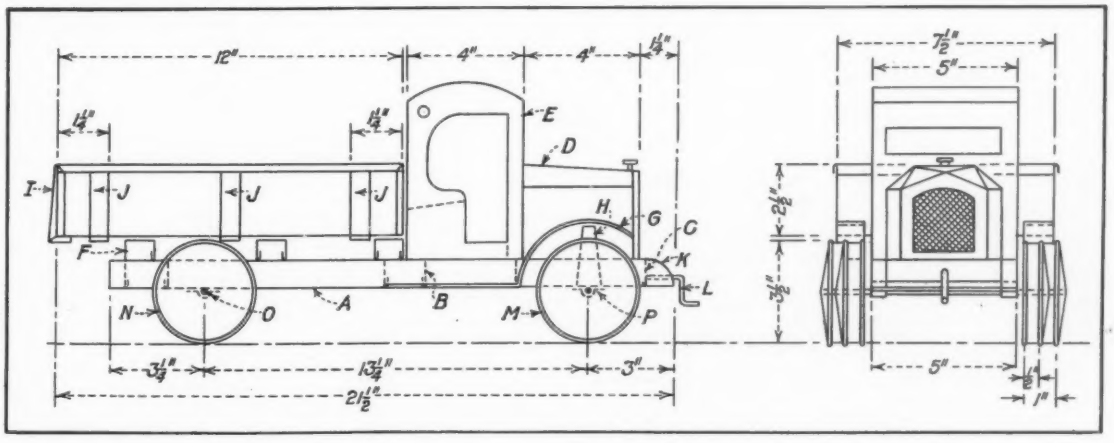
Next, lay out eight body posts J, forming them as shown, and then solder them to the body on the sides and back. Solder the body to the frame.

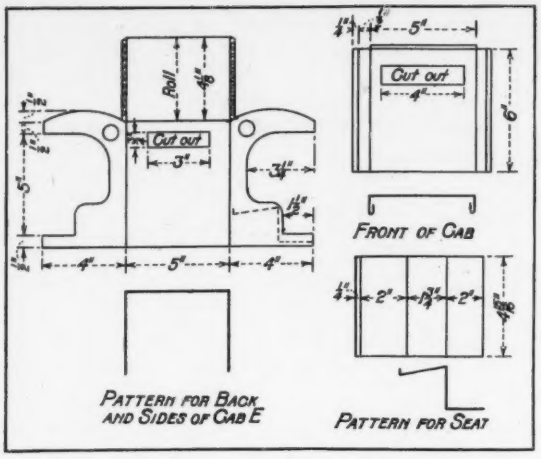
The next layout is the front-bumping bar K. Roll it around a ¼-in. iron rod, and after it is formed, solder it on the front end between the frames A.

Next, cut a piece of No. 7-gauge galvanized wire 7 in. long, and bend as shown for the crank handle L. Take two 10-lb. tinned rivets, saw off the stems, and punch holes through the heads of the rivets to make washers. Run the crank through the hole in section C, and solder the washers to the crank handle so it will turn but will not come out.

Cut two pieces of No. 5-gauge galvanized wire for the front and rear axles O. Then lay out four bearings marked P, and form over No. 5-gauge wire, as shown.

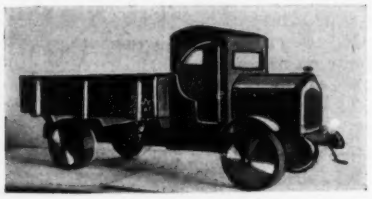
The front wheels marked WW are the next to be laid out. For the rims of the wheels use common tin-can tops such as are found on cans for peas or corn. They should measure about 3½ in. outside diameter. Cut the bottom off the tin can about ¼ in. up from the rim. Cut two for each wheel and lay out a strip ½ by 10½ in. Roll and solder this between the two rims, making the wheel ½ in. wide. Next, drill a hole through both sides in the center. Lay out the outside disc and place into the rim and solder on to the outside of the wheel only. The hole must be drilled through the disc also.





The two back wheels are layed out and made in the same manner, except for the strip soldered between the two rims which is 1 in. instead of ½ in. wide.

When the four wheels are made, put the axles in place and solder to the inside and outside of the wheels to insure strength. Fasten the axles to the frame by placing bearings, marked P, over the axles and solder to the frame. This completes the truck.



TOY TRUCK

It will roll evenly if the frame is carefully soldered level when first put together. If it does not roll evenly, shim up under the bearings until the wheels are even.

For tires, use ½-in. and 1-in. strips cut from a heavy 3½-in. inner tube. Stretch these pieces over the wheels just as you would an elastic band. This makes a very satisfactory tire, and the truck will roll almost noiselessly.

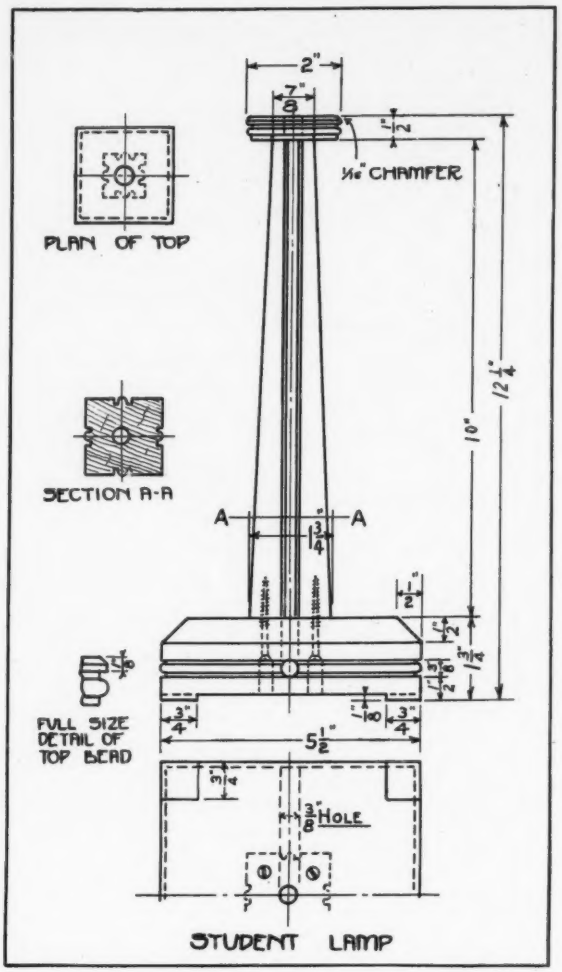
A FARM WOODWORK PROJECT

Frank W. Dejmek, Marinette Vocational School, Marinette, Wis.

Stair building proves to be an interesting subject to farm boys. They realize, perhaps from past experience, that a carpenter is not always at hand to replace an old stairway or to build a new one if one is desired. It means quite a saving to the farmer who can build his own stairs.

The types of stairs that are commonly found on farms are (1) porch steps, (2) inclosed stringer, (3) open stringer. Figure 1 illustrates the three types of stairs. These stairs can easily be built by boys who have a fair knowledge of stair construction. Every farm tool chest contains the few tools necessary for the construction of any of the stairs mentioned.

FIG. 1.



STUDY LAMP DESIGNED BY KENNETH W. JAMES

Figure 1 also illustrates the various pitches of stairs. The one on the left has a very steep pitch, while the other three have a more moderate pitch. The stairs shown are half size, making them convenient to handle in the shop. The method of construction is the same as that of full-size stairs.

The farm woodworking class first studies and discusses the various types of stairs. Then the students are divided into groups, each group being assigned to construct a certain type of stair, having the rise, run, and tread of the stair given. Difficulties that arise are discussed in class.

For work of this sort, which is not permanent, box lumber can be used, thus making the cost of the material very small.

STUDY LAMP

Kenneth W. James, Detroit, Mich.

The study lamp shown in the accompanying illustration makes a very simple job for the elementary woodworking class. The effect of the beading makes the lamp a very attractive project.

SPANISH TABLE

R. M. Hammes, Lincoln High School, Council Bluffs, Iowa

The Spanish table shown herewith may be found to be a new problem for the school shop. It adds the touch of color needed in most rooms. It will be especially appropriate in houses of the Spanish type.

The covering is not necessarily limited to this type of table, however. It is equally adaptable to a variety of tables ordinarily produced in the school shop.

TRACING SUPPLEMENT No. 120.
THE INDUSTRIAL-ARTS MAGAZINE,
JANUARY, 1929

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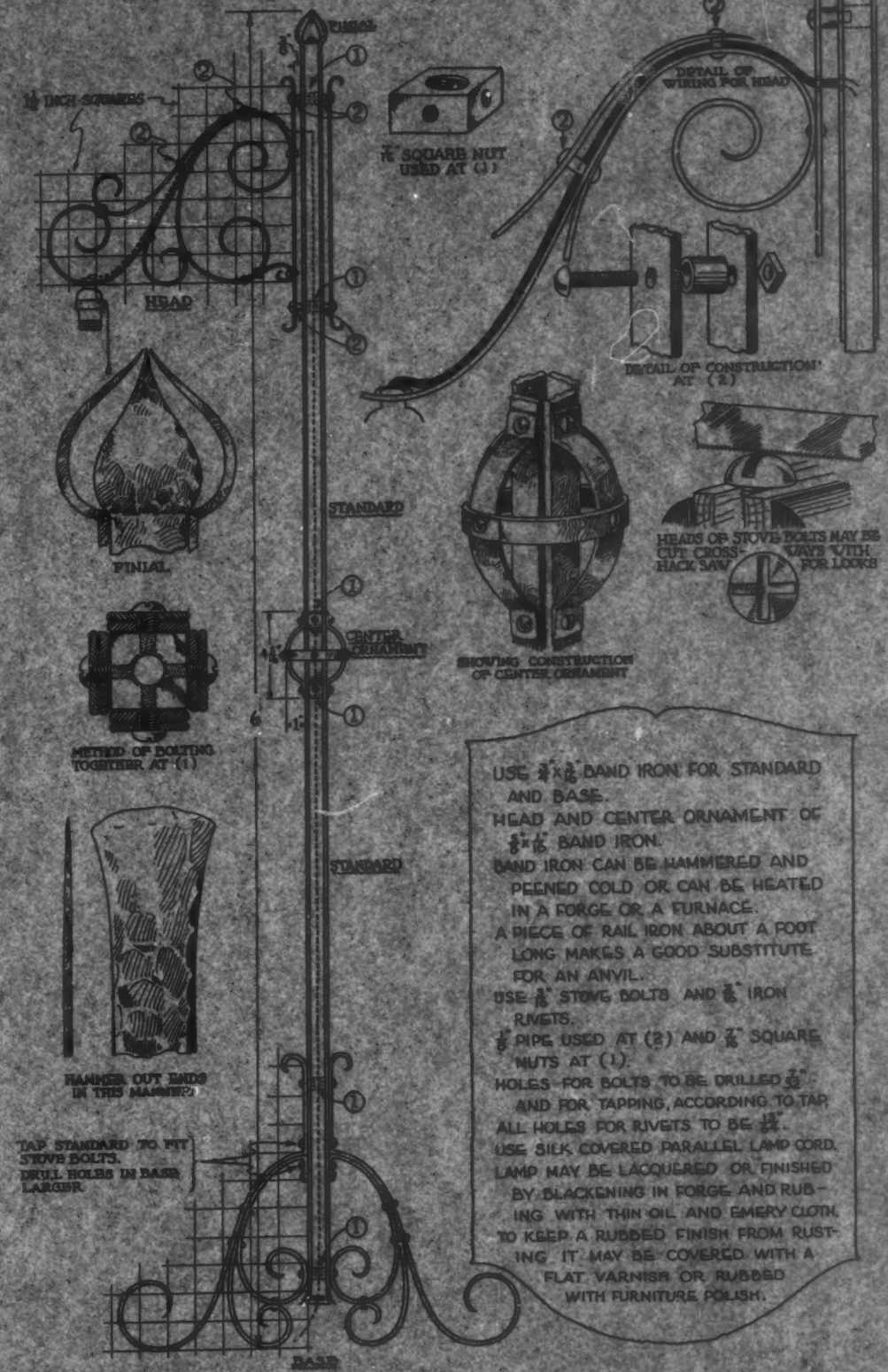
WROUGHT IRON BRIDGE LAMP


FINIAL
½ INCH SQUARES
HEAD
⅜" SQUARE NUT USED AT (1)
DETAIL OF WIRING FOR HEAD
DETAIL OF CONSTRUCTION AT (2)
FINIAL
STANDARD
SHOWING CONSTRUCTION OF CENTER ORNAMENT
HEADS OF STOVE BOLTS MAY BE CUT CROSS-WAYS WITH HACK SAW FOR LOOKS
CENTER ORNAMENT
METHOD OF BOLTING TOGETHER AT (1)
STANDARD
HAMMER OUT ENDS IN THIS MANNER
TAP STANDARD TO FIT STOVE BOLTS.
DRILL HOLES IN BASE LARGER
BASE

USE $\frac{3}{8}$"×$\frac{1}{16}$" BAND IRON FOR STANDARD AND BASE.
HEAD AND CENTER ORNAMENT OF $\frac{5}{8}$"×$\frac{1}{16}$" BAND IRON.
BAND IRON CAN BE HAMMERED AND PEENED COLD OR CAN BE HEATED IN A FORGE OR A FURNACE.
A PIECE OF RAIL IRON ABOUT A FOOT LONG MAKES A GOOD SUBSTITUTE FOR AN ANVIL.
USE $\frac{1}{4}$" STOVE BOLTS AND $\frac{3}{16}$" IRON RIVETS.
$\frac{1}{8}$" PIPE USED AT (2) AND $\frac{7}{16}$" SQUARE NUTS AT (1).
HOLES FOR BOLTS TO BE DRILLED $\frac{7}{32}$" AND FOR TAPPING, ACCORDING TO TAP.
ALL HOLES FOR RIVETS TO BE $\frac{13}{64}$".
USE SILK COVERED PARALLEL LAMP CORD.
LAMP MAY BE LACQUERED OR FINISHED BY BLACKENING IN FORGE AND RUBBING WITH THIN OIL AND EMERY CLOTH. TO KEEP A RUBBED FINISH FROM RUSTING IT MAY BE COVERED WITH A FLAT VARNISH OR RUBBED WITH FURNITURE POLISH.

Designed by W. Ben Hunt, Milwaukee, Wis.

U. OF MICH.

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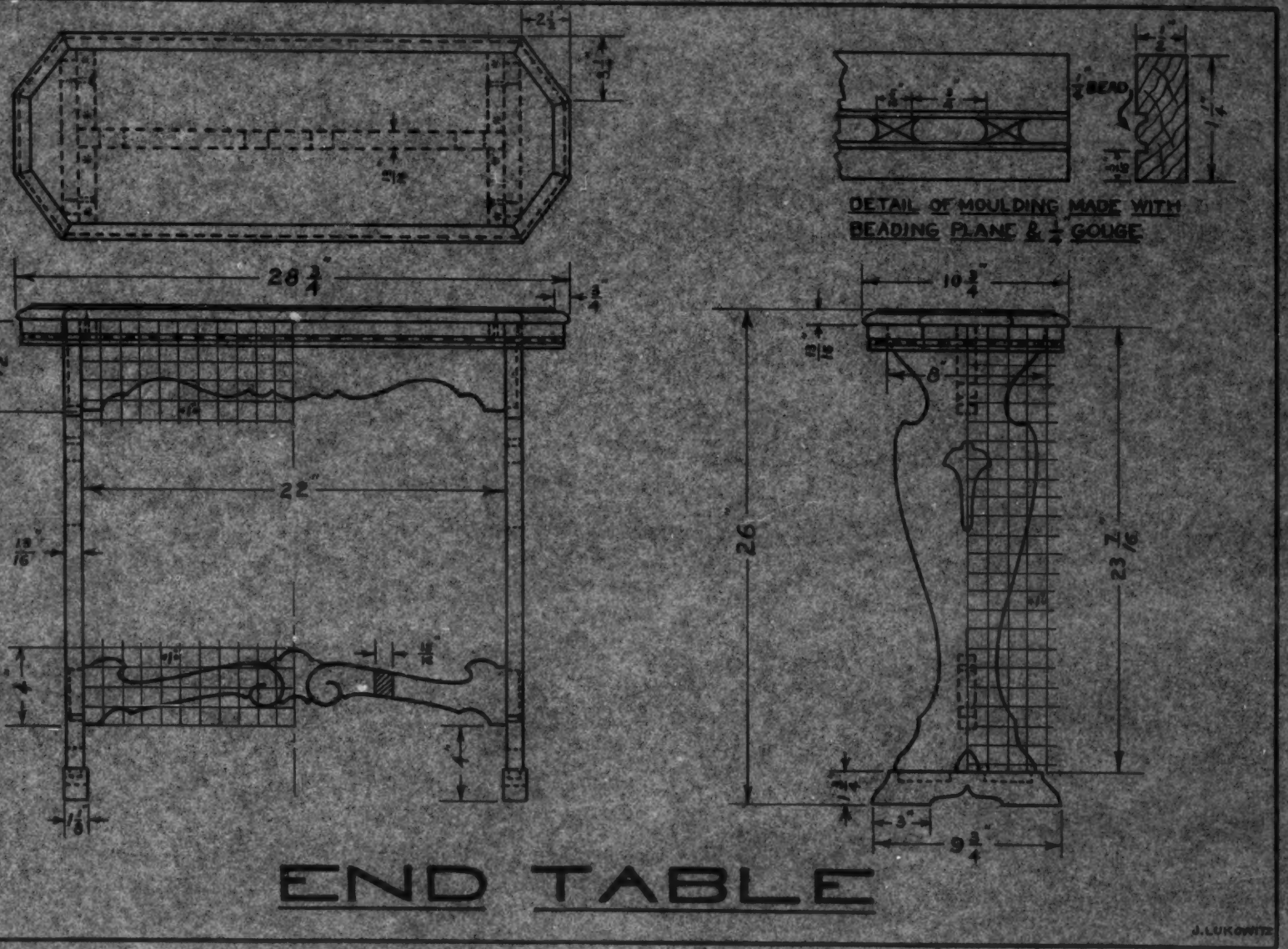

END TABLE

Designed by Jos. J. Lukowitz, Milwaukee, Wis.

For Description See Page 68, Industrial-Arts Magazine, January, 1929.

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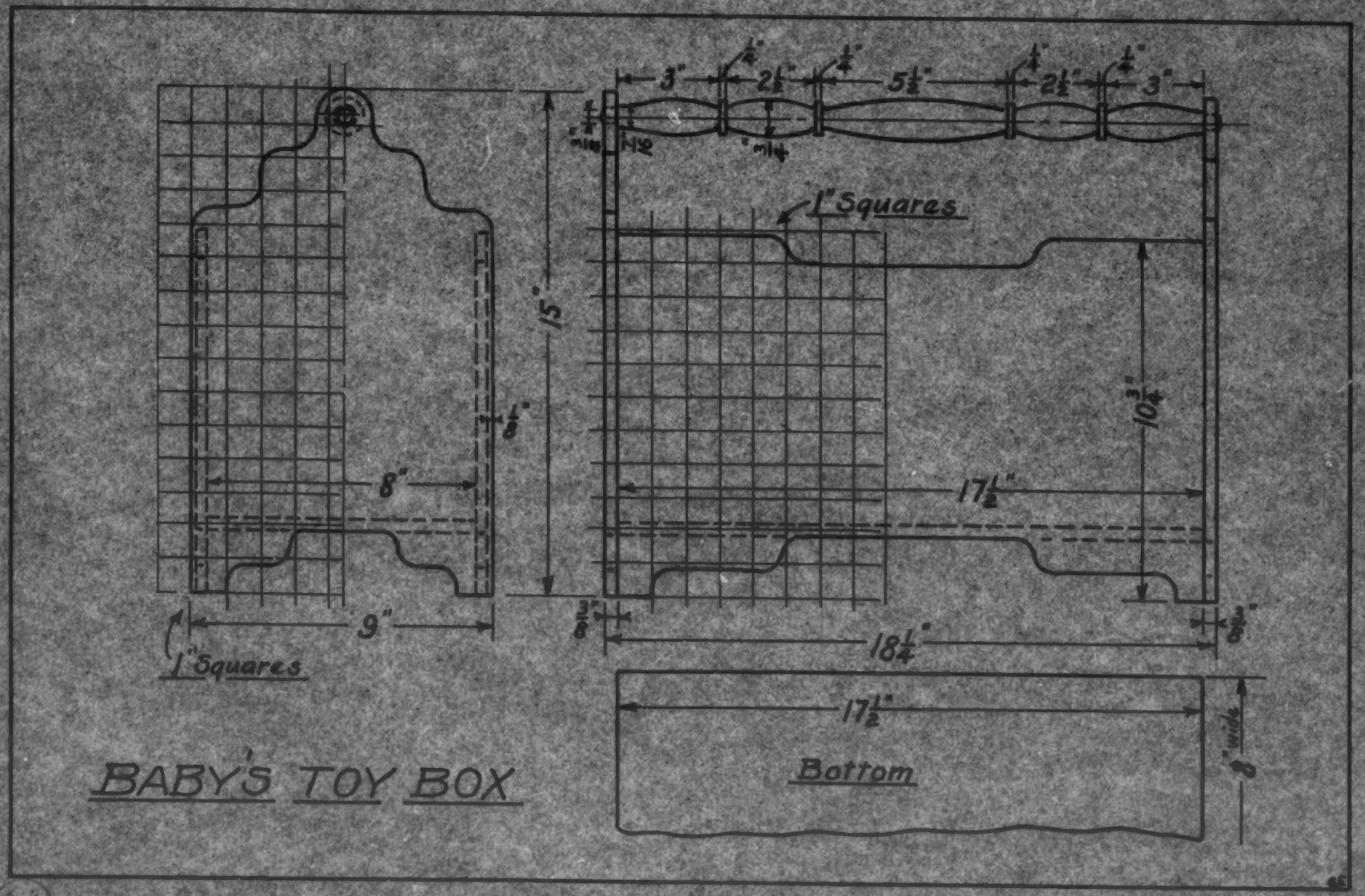

BABY'S TOY BOX

Designed by K. A. Reruche, Wakefield, Mich.

For Description See Page 93, Industrial-Arts Magazine, January, 1939.

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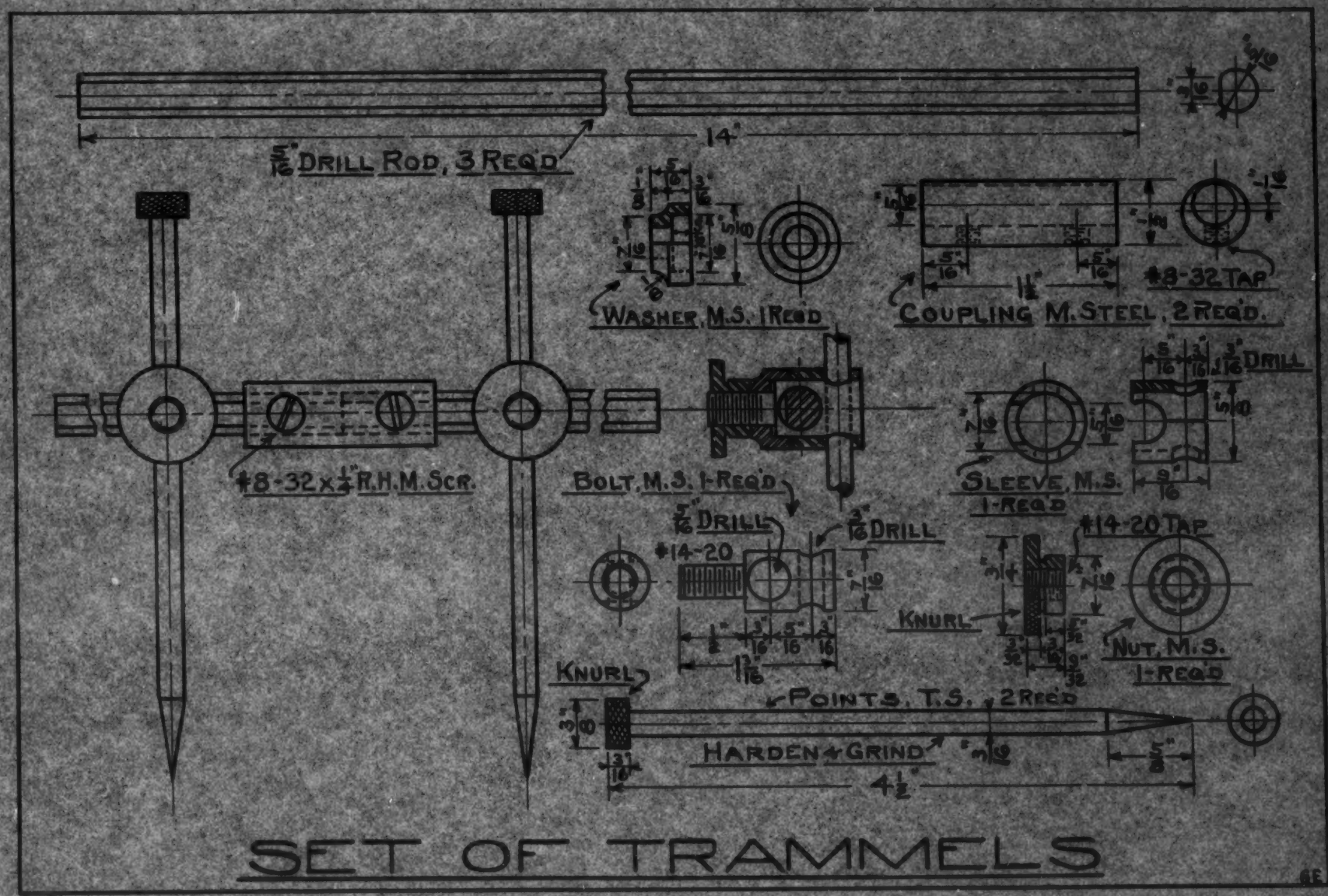
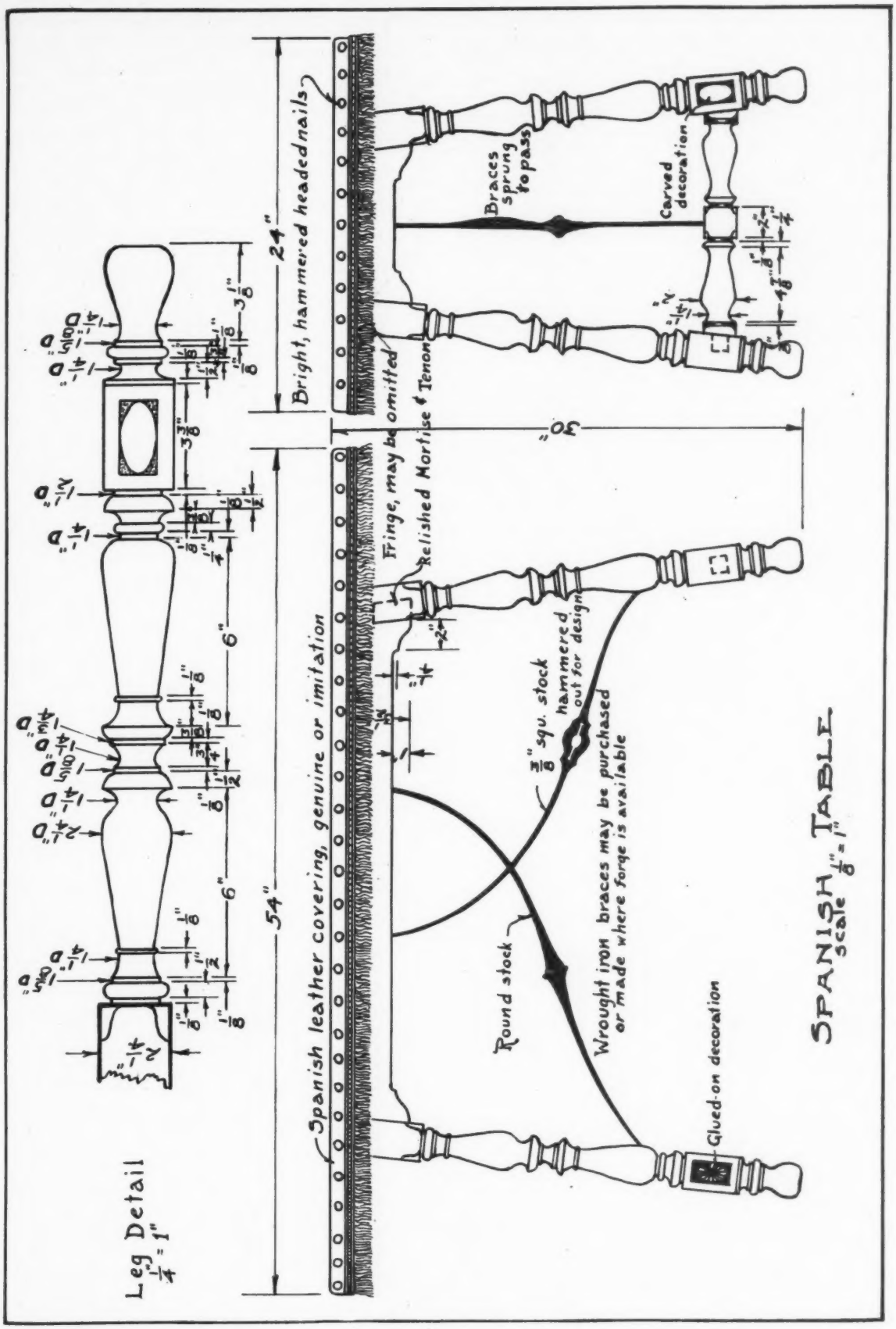


SET OF TRAMMELS

GE

Designed by Frank S. Hale, Homestead, Pa.

For Description See Page 43, Industrial-Arts Magazine, January, 1929.


Leg Detail
1/4 = 1"
Spanish leather covering, genuine or imitation
54"
24"
Bright, hammered headed nails
Fringe, may be omitted
Relished Mortise & Tenon
30"
Braces sprung to pass
Carved decoration
Round stock
Wrought iron braces may be purchased or made where forge is available
3/8" squ. stock hammered out for design
Glued-on decoration
SPANISH TABLE
scale 1/8" = 1"

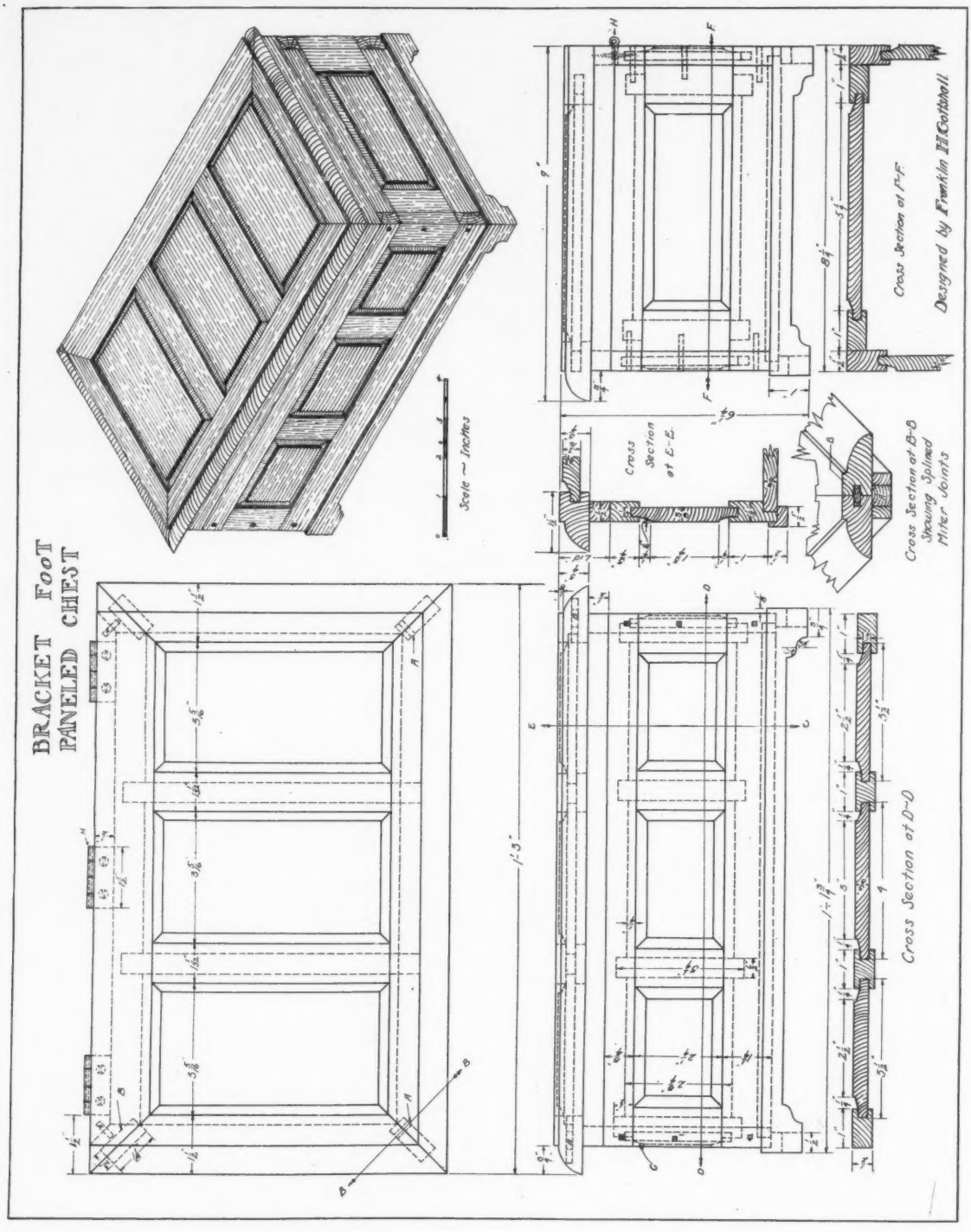
BRACKET-FOOT PANELED CHEST

Franklin H. Gottshall, Director of Industrial Arts, Mount Berry School for Boys, Mount Berry, Ga.

Chests are found among the earliest forms of furniture. There is always something fascinating about a chest. Often in the early days they were the repository for the family treasures of silks, linens, plate, and so forth. Their number and method of decoration denoted, in a large measure, the wealth or position of the family that owned them. Although they are no longer as common as they once were, due to the innovation of built-in closets, we find very few homes that do not have at least one chest.

The bracket-foot paneled chest described herewith will make a good class problem, especially since it is not large and can be made on the workbench which is found in the ordinary school shop, and with the usual equipment. It is also conservative in the use of stock. It was designed to hold stationery and can be conveniently placed on top of a table or desk.

The sides of the chest are made of ½-in. stock with the exception of the panels which are made ⅜ of an inch thick. The panels are all raised on the face side and this is done without the use of machinery. The raised portion is laid off by means of a gauge, a try-square, and a sharp knife. First


BRACKET FOOT PANELED CHEST
Designed by Franklin H. Gottshall
Scale — Inches
Cross Section at F-F
Cross Section at E-E
Cross Section at B-B Showing Spined Miter Joints
Cross Section at D-D

cut the panels to size and thickness, smoothing up the pieces. Then lay them out and lower the edges outside the lines ⅛ of an inch. On this lowered portion, lay off the rim which is to fit into the frame. When this has been cut down to ¼ of an inch you will have a series of three steps. You are then ready to bevel the middle step, finishing your panel.

The lid and sides are constructed practically alike with a few exceptions. The sides of the lid are joined with a splined miter joint, as shown at A, while the sides of the chest are butted against the ends and glued and pinned. See cross section FF. For the pinning, use square oak pins, which are driven into round holes which have a diameter equal to the distance across the flat sides of the pin. A spline is also used in joining the miters of the lid proper as shown by the cross section BB. It is best not to mold the edge of the lid until it has been put together. The hinges, by means of which the lid is fastened, should be of brass.

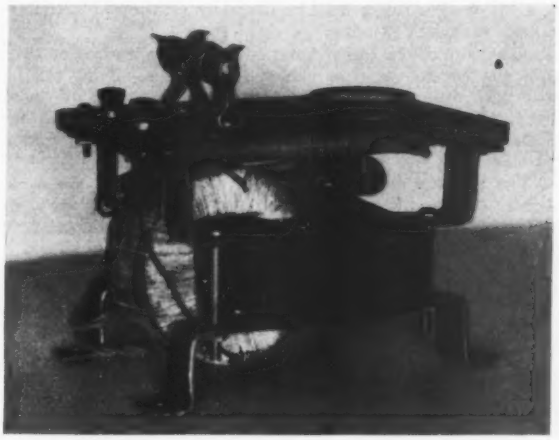
After the chest has been made, the feet are fastened to it by means of glue and by brads from the under side. The construction can be clearly understood by a study of the cross section at EE. A miter joint is used at the corner in this case also.

This problem will require very careful workmanship on the part of the student, but if he completes it he will have accomplished something worth while.

A SIMPLE BATTERY CHARGER

L. M. Klinefelter, Ruffner Junior High School, Norfolk, Va.

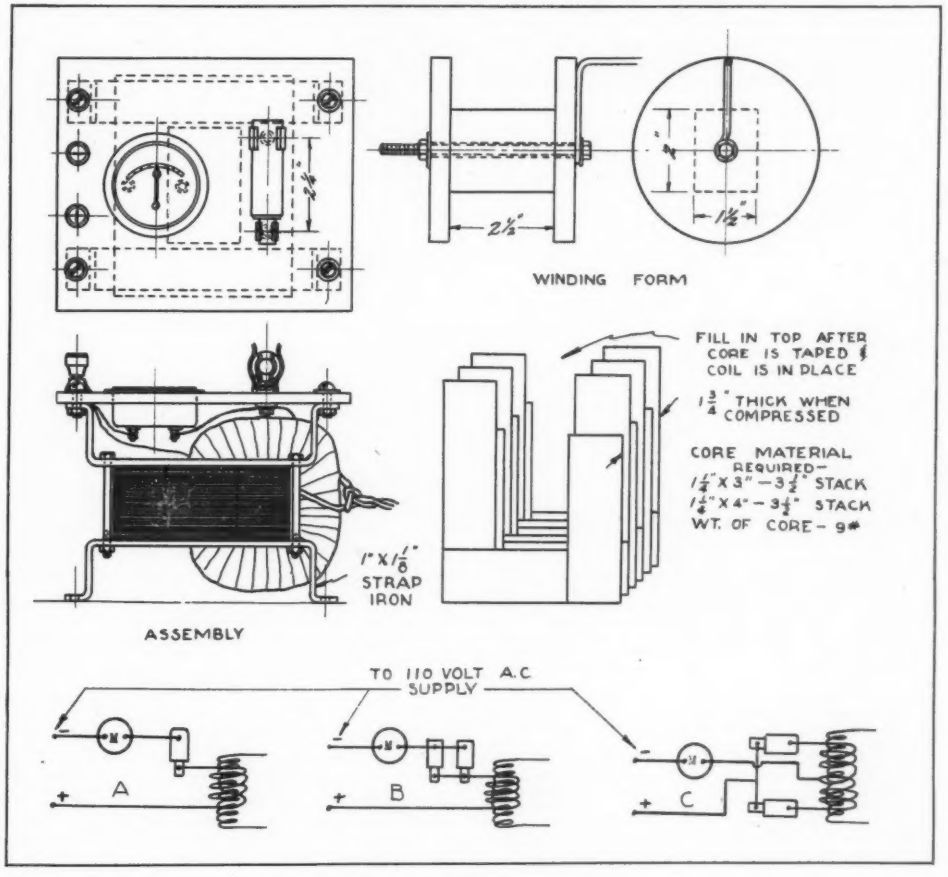
Even in these days of alternating-current vacuum tubes, a good battery charger is often a great convenience, if not an actual necessity. The one shown herewith is not only efficient and quiet in operation, but is simple and easy to make. It consists of a step-down transformer having a secondary voltage of 9 volts and a Ratheon type-A rectifier cartridge. This rectifier was chosen on account of the fact that it does not have a filament as is the case with the rectifier bulbs in



A SIMPLE BATTERY CHARGER

common use, and also because of its much lower resistance which makes it a very efficient charger. The absence of filament increases the efficiency of the charger and simplifies the transformer, since no filament winding is needed. The life of the cartridge rectifier is about the same as that of the rectifier bulbs.

The general construction and arrangement of the charger is shown in the illustration. Only essential dimensions are given, and others can be made to suit the material at hand. The transformer is made larger than is absolutely necessary, so as to insure cool operation. The capacity or charging rate of the charger can be doubled by using two rectifiers in parallel if wire of sufficient size is used in winding the coils,



DETAILS OF BATTERY CHARGER

or a full-wave charger may be made by putting on a center-tapped secondary winding.

The core of the transformer is made from ordinary stovepipe iron cut to the sizes shown. While the cutting can be done with ordinary snips, much time can be saved by doing the cutting on the squaring shears. The sides and bottom of the core are built up as shown in the illustration, pressed together in a vise and taped up with friction tape.

The winding form is made of three pieces of wood, as shown. These are held together by a long bolt through the center. The projecting end of the bolt may be inserted in a suitable hole drilled in the edge of a bench or box, and a wire crank on the opposite end of the form makes winding easy. The form should be lined with cardboard to hold the coil together when it is removed for taping, and also to serve as insulation.

The number of turns in a transformer coil depends on the voltage, frequency or cycles, and size and material of core. Since 60 cycles is commonly used, we will assume that to be the frequency. The primary voltage will probably be in the neighborhood of 115 or 120 volts, and the required secondary voltage is 9. Using a core of ordinary stovepipe iron with a cross section of 1¼ by 1¾ in., we are safe in figuring on five turns per volt. If you can get good transformer iron, the cross section may be reduced to 1¼ by 1¼ in., with five turns per volt. Taking 115 volts as an average, the primary winding should have $5 \times 115 = 575$ turns. The wire should be No. 22 or No. 23 d.c.c. magnet wire. If two cartridges are to be used, either in parallel or in the full-wave arrangement, use not smaller than No. 22 wire for the primary. Larger wire is, of course, entirely satisfactory but will make the coil larger. Smaller wire is likely to make the transformer heat up dangerously.

Before starting the winding, a piece of lamp cord about 18 in. long should be spliced and soldered to the end of the magnet wire, the splice taped and the end of the lamp cord brought out through a hole in the crank end of the form. Enough of the cord should be left inside the form to make a full turn around the core before reaching the magnet wire. This is to prevent breaking off the end of the wire at the point where it enters the coil. Wind the wire on carefully in layers, counting each layer. Put a strip of writing paper between layers. After winding on the required 575 turns, splice on another piece of lamp cord as was done at the start, take a turn around the coil with the cord and bring out the end through another hole in the end of the form.

Put on a layer or two of heavy drawing paper over the primary winding and you are ready to start the secondary. This is wound directly over the primary. As already mentioned, the open circuit voltage of this coil is 9 volts so we will want $5 \times 9 = 45$ turns. If a full-wave charger is to be built, put on 90 turns and bring out a center tap. This is done by splicing on a short piece of wire at the 45th turn. For a single-cartridge charger of the full-wave arrange ment, use No. 14 wire on the secondary coil. If two cartridges are to be used in parallel, use No. 12. On account of the size of the wire it will not be necessary to splice on the lamp cord as was done on the primary.

After the secondary has been wound, take the form apart and drive out the core. Tape the coil up tightly with white cotton tape, if it is available. If not, use friction tape or strips of cloth of any kind. Lap the turns so as to thoroughly secure and protect the coil.

After the coil is taped, slip it on one leg of the core and fill in the open side with the remaining laminations. If this is carefully done the core will be uniform on all sides and corners, and form a good path for the magnetic flux. The transformer is now complete and should be given an open-circuit test by connecting the primary to the a.c. supply and leaving it so connected for some time. The core should heat up slightly but the coils not at all or very little. If the coil heats up seriously, it is an indication of shorted turns in the coil which must be found and insulated. If the coils have been carefully wound there is little probability of this however.

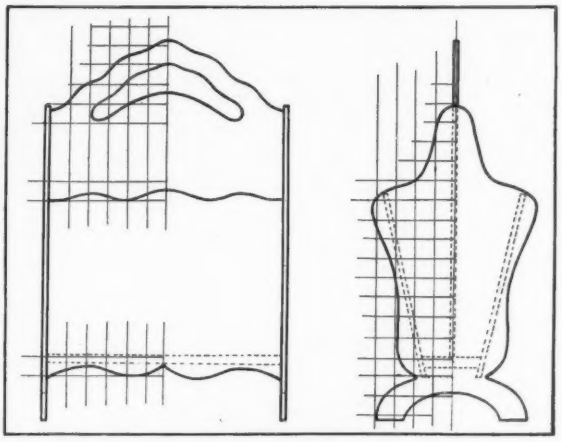
After the transformer has been tested, make the mounting brackets and bolt it together. These brackets also serve as feet for the charger and as a support for the panel. The panel may be made of bakelite, hard rubber, slate, or wood. The meter shown on the panel is not absolutely required but is quite an addition to the charger. Any direct-current ammeter, reading as high as 5 or 10 amperes, will serve. One salvaged from the dash of a junked auto will do nicely. The clips for holding the rectifier cartridge are bent from strips of brass or cold-rolled copper. A good plan is to get the cartridge and then bend the clips to fit it. Binding posts for connecting the battery are added and you are ready to wire the charger. The circuit is very simple, as shown in the diagrams. The secondary coil, meter, rectifier, and battery are all connected in series, being careful to get the small end of the cartridge to the positive terminal of the battery. The charging rate should be from 2 to 2½ amperes if a single cartridge is used, and from 4 to 5 amperes if two are used in either the parallel or full-wave arrangement. If it exceeds these values, connect a piece of resistance wire in the charging circuit to bring it down to the proper amount.

If carefully built, this is one of the quietest, cheapest, and most efficient chargers.

MAGAZINE RACK

R. H. Grob, Sheboygan, Wis.

This magazine rack is very simple in construction and can be made by any boy with the very simplest of tools. The first thing to do is to secure some 3-ply plywood either ¼ in. or ⅜ in. thick. Plywood covered with birch or gumwood on both sides is best suited for this type of work. After having obtained the wood, the patterns may be laid out. A simple way to do this is to mark the 1-in. squares on a large piece of cardboard. By drawing the lines through the 1-in. squares, as shown in the illustration, a very exact reproduction of the patterns can be made. These completed patterns will be full size, which may be transferred to the plywood and cut out on a band saw, or if the latter is not available, with a coping saw. The inside opening for the handle must be cut out with a coping saw. All edges must be carefully sanded. The rack may be assembled with 1-in. or 1¼-in. No. 17 or 18 brads.



A magazine rack of this type may be finished in many different pleasing colors. Some very pleasing effects may be obtained by lacquering them black with Chinese-red edges or black with gold edges, or Chinese red with gold edges, or jade green with a dark-green edge. Many other pleasing combinations can be made. Transfers may also be placed on the front panels.

SEWING CADRE

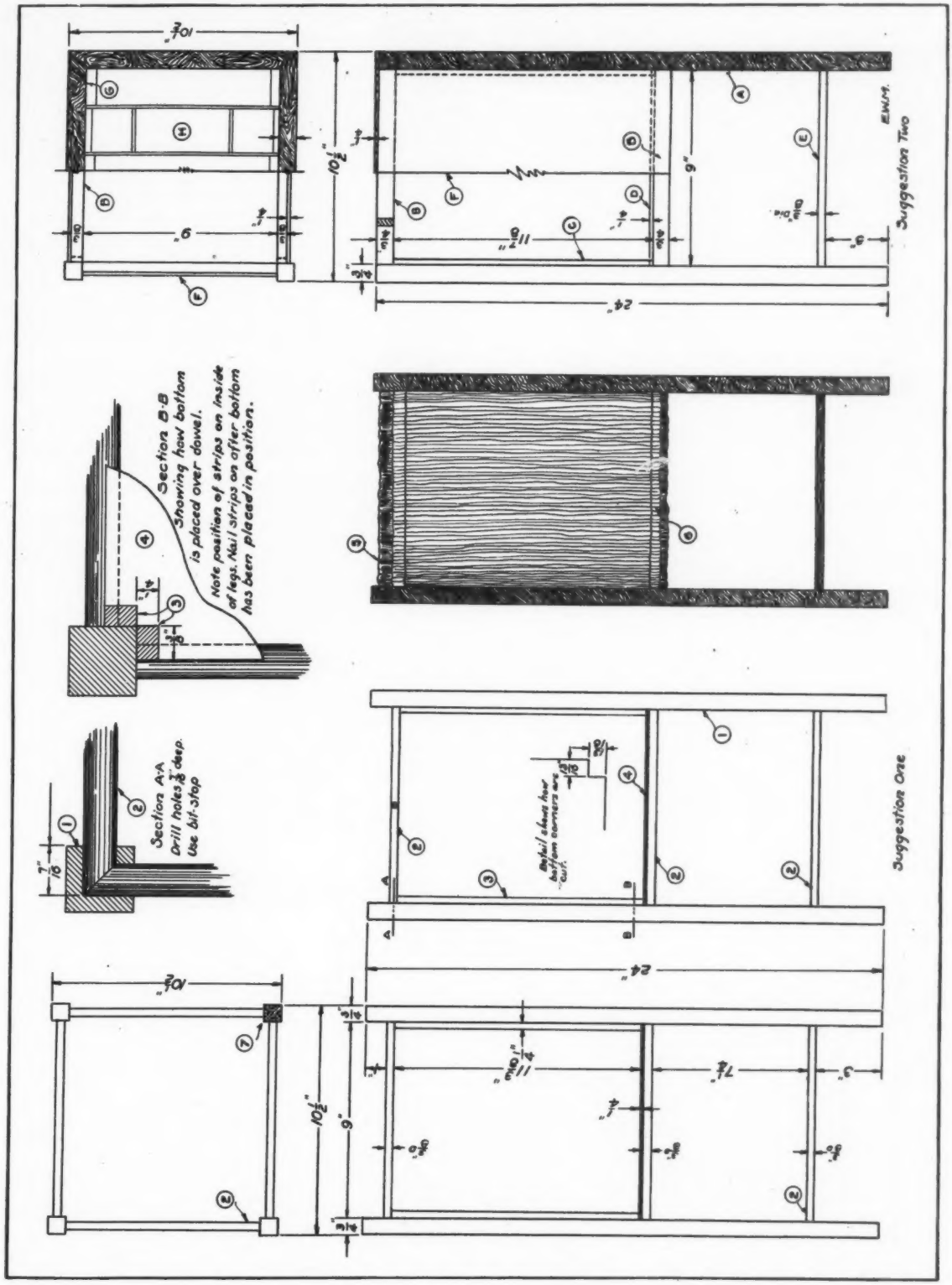
E. W. Manzer, Supervisor of Manual Arts, Bronxville, N. Y.

This practical project has been made in some of the writer's classes. Because of its popular appeal to the students, it is recommended to other men in the field of manual arts who are looking for new projects for their classes.

Two separate suggestions are given. This is done, primarily, to show the students that there are possibilities for their own ideas and creative ability in the projects which they may undertake. It is not necessary for them to make

the sewing cadre just as it is shown in the drawing. Many modifications are possible and it is hoped that everyone making the project will add their own ideas to the suggestions given. For example, one boy may suggest a solid top which may be made in two parts, opening from the center, and hinging on the sides. When open, the covers may form a ledge for scissors, spools, and other sewing articles; when closed, the cadre can be used to hold a lamp, candlestick, or photograph.

Another boy may want to make a solid top, and one of the panels sliding down a dado in the legs, thus opening the cabinet.


Suggestion Two
Section B-B
Showing how bottom is placed over dowel.
Note position of strips on inside of legs. Nail strips on after bottom has been placed in position.
Section A-A
Drill holes ⅜" deep. Use bit-stop
Suggestion One
24"

In Suggestion I, three sides could be made with wall board, Masonite Presdwood, or plywood. The fourth side could embody the cloth-curtain idea. This curtain should part in the center and slide on two dowel rods.

The top could be solid, thus making the article a useful stand. Suggestion I is planned for four sides of curtain material, such as chintz or cretonne, the cloth being cut full so as to give plenty of material for shirring.

This plan is given because of its adaptability as a Christmas or bazaar project. It can easily be made and sold in knockdown form. Each set of legs and other material being tied up and sold at the bazaar as unfinished material. A small can of glue and a few small brads are all that is needed for putting the project together.

The following material bills will aid the student in reading the drawing and thus get the general dimensions:

Bill of Material—Suggestion I

4 pc. ¾ x ¾ x 24	Legs
12 pc. ⅜ diam. x 9¾	Dowel Rods
8 pc. ¼ x ⅜ x 11⅜	Side Strips
1 pc. ¼ x 9¾ x 9¾	Bottom (Plywood)
	Sides (Cloth) with tunnels for dowel rods
4 pc. ¾ x ¾	Ornaments

Bill of Material—Suggestion II

4 pc. ¾ x ¾ x 24	Legs
8 pc. ⅜ x ¾ x 9	Rails
8 pc. ⅜ x ⅜ x 11⅞	Side Strips
1 pc. ¼ x 9¾ x 9¾	Bottom (Plywood)
4 pc. ⅜ diam. x 9⅞	Bottom Rail
4 pc. ¼ x 9 x 13⅜	Side Panels
4 pc. ¼ x 10½ x 10½	Top Molding
1 pc. optional	Spool and Scissors Tray

SECTIONING JIG

M. W. Shillinger, South High School, Grand Rapids, Mich.

Sometimes a drawing, which is otherwise very good, presents a very poor appearance on account of poorly spaced cross-sectioning. To aid the student in the spacing of these lines, the sectioning jig described herewith may be used. This jig is simple and at the same time adjustable for any width of spacing or for any size of triangle.

The main portion of the jig is made of maple, cherry, or any other hard close-grained wood, and the adjustable part is of thin brass. The ⅛-in. piece, marked A, may be glued on after the top edge has been planed smooth and straight. The thin piece on the bottom must be the same thickness as the brass. Because it is difficult to put on such a thin piece, a thicker strip may be glued on and this planed to the desired thickness when the glue is dry.

In use, the triangle rests between the stop at the left end of the top edge and the adjustable brass piece at the right, with the clearance set for the desired sectioning. The jig, of course, is placed against the top edge of the T square. The jig and triangle are moved alternately along the T square for spacing. This instrument may also be used for other purposes where spacing is required.

FOLDING CHAIR

Dean E. Johnson, High School, Gardner, Mass.

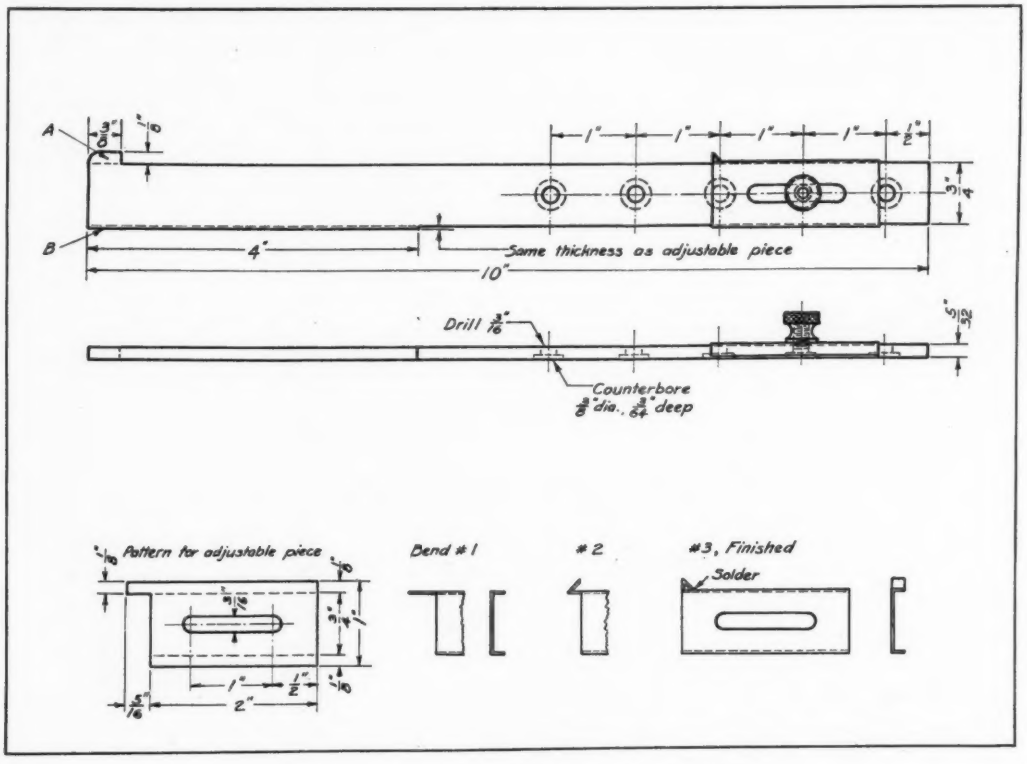
This is a project that is very popular with most boys because it makes good camp equipment, or it may be used for extra seats at the school sports. At first glance it may appear complicated, but it is not difficult. The various pieces, however, must be measured and marked accurately for the lengths and bends. The holes for rivets also must be marked and center punched with care.

The chair is made of $\frac{3}{16}$ by ⅝-in. bar-iron stock with a canvas seat and a slip-on back. When folded, it takes very little space, about ⅞ of an inch, and is very light weight.

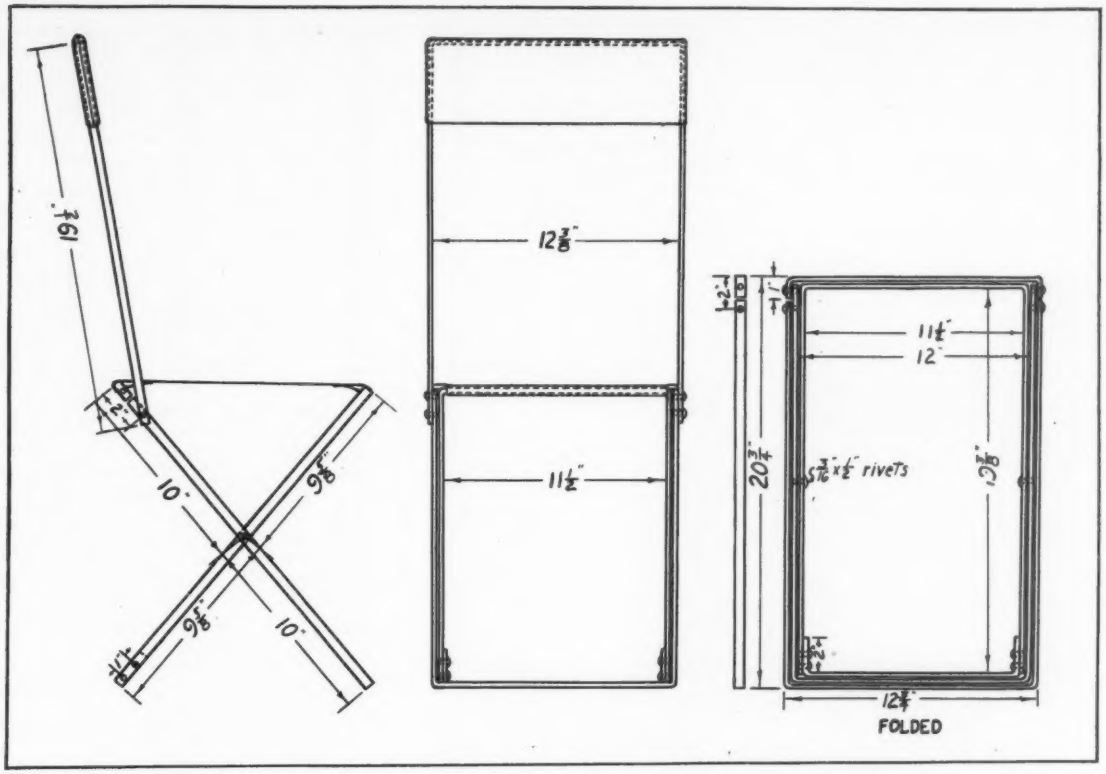
The illustrations show the dimensions to be used for a child's chair, and also for a chair which is to be used by adults.

Steps for Making a Folding Chair

1. Study the blue print.
2. Procure the required amount of $\frac{3}{16}$ by ⅝-in. bar iron.
3. Mark the lengths and the bends for the inside square of the lower part of the chair. After you have the piece laid out, show it to the instructor.



SECTIONING JIG DESIGNED BY M. W. SCHILLINGER.



4. Cut them to length with a hack saw or shearing cutter.

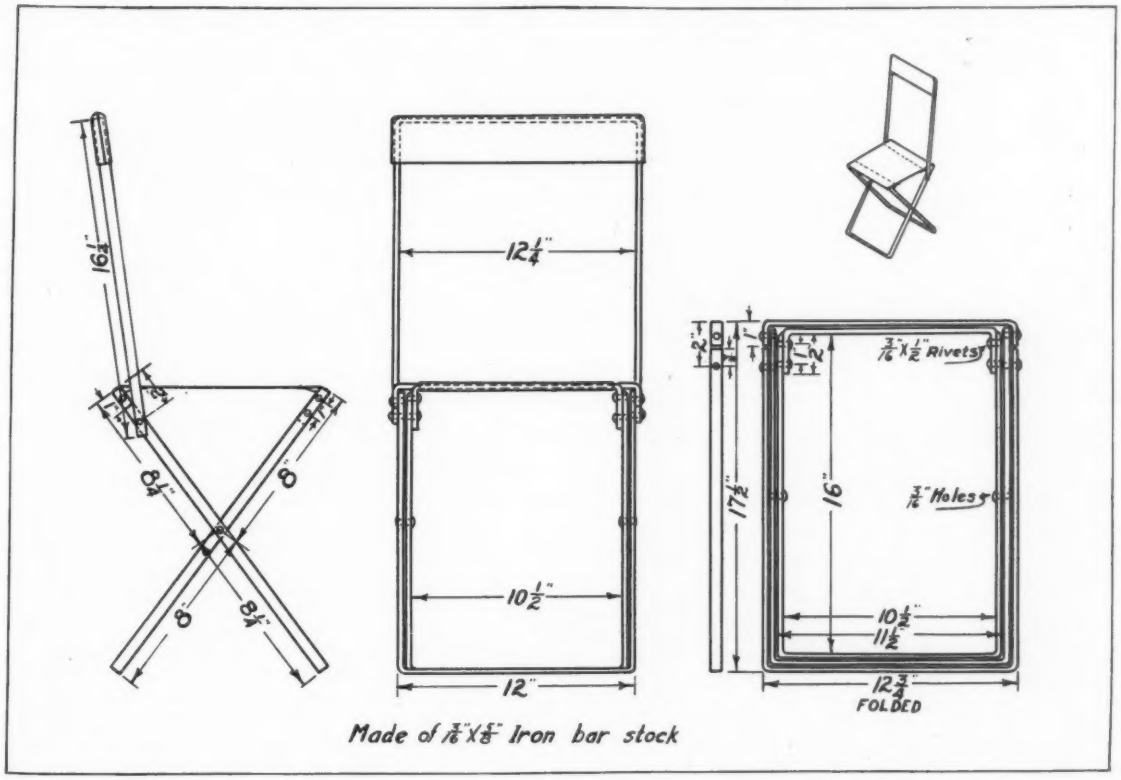
5. Mark the centers for the holes and center-punch. Have your layout checked by the instructor.

6. Drill the holes for the rivets.

7. Bend the corners in the vise.

8 Assemble the square by riveting the end piece in place. Be sure that the heads of the rivets are on the inside of this square.

9. For the outside square of the lower part of the chair,



follow the same steps as you did for the inside square. The rivet heads on this part, however, should be on the outside.

10. These two squares can now be assembled by putting the rivets in, upon which they hinge or pivot.

11. The back iron can now be cut, drilled, bent, and riveted together.

12. The seat is of heavy brown canvas, first pinned in place and regulated to allow the proper opening of the seat. It is then ready to be taken to the domestic-science department to be sewed.

13. The slip or cover for the back, made of the same material, can be made at the same time.

14. The incline of the back can be regulated by filing off the corners of the crosspiece which checks and holds the back in position.

15. The exposed iron parts of the chair are now washed with gasoline to remove grease or oil, and a coat of black enamel is applied.

16. The cost is found by weighing the bar stock and figuring it at 10 cents per lb. Canvas costs about 60 cents per yd. The rivets and enamel will be included in the overhead, which should be calculated at 10 per cent, provided no material was spoiled.

TWO PROBLEMS FOR THE FARM MECHANIC

L. M. Roehl, Assistant Professor, Cornell University
Ithaca, N. Y.

Job 1. To Make a Dandelion-Digging Tool

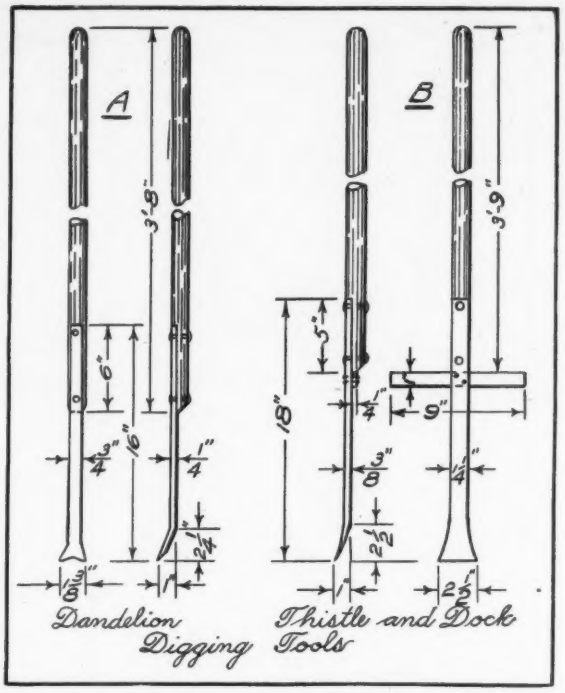
Purpose: To make a handy tool for digging dandelions and for developing skill in forging, grinding or filing, measuring, drilling, and riveting.

Tools Needed: Rip and panel saw; hack saw; forge; ball-peen hammer; center punch; ¼-in. drill; file or grinder.

Material Needed: A piece of mild steel ¼ by ¾ by 16 in.; two ¼ by 1¼-in. rivets; a handle from an old broom, hoe, or fork.

Procedure:

1. Cut a piece of iron of the required size to a length of 16 in., using a hack saw, a cold chisel, or a hardie for cutting.



2. Heat one end of the iron in the forge, and forge it out fan-shaped to a width of 1¾ in. at the edge.

3. Hold the iron on the anvil, with the forged end projecting 2¼ in. over the edge, and bend the end to a 1-in. offset as shown in the illustration.

4. Grind or file a notch in the cutting end so as to prevent the tool from slipping around the root of the plant, and also file or grind the end to a desired cutting edge.

5. At a point 6 in. from the lower end of the handle, cut a notch ¼ in. deep.

6. Rip a ¼-in. piece from the end of the handle down to the notch.

7. Locate holes on the iron for the rivets, and center-punch for them.

8. Drill the ¼-in. holes in the iron.

9. Place the iron in position on the handle, clamp in a metal vise, then place the metal drill in the hole in the iron and continue on through the wood.

10. Place the rivet in the hole from the wood side, and cut it with the hack saw or cold chisel so that it does not project more than 3/32 in.

11. Hold the work on an anvil, and rivet the iron to the handle using the ball-peen hammer. Direct the blows of the hammer so as to make a smooth, rounding head, instead of squashing the metal out flat and irregular.

12. Again place the work in the metal vise, making sure that the iron and handle are parallel, and place the second rivet.

Job 2. To Make a Digging Tool for Thistle and Dock

Purpose: To make a handy tool for digging thistle and dock, and for developing skill in the tool operations as in making the dandelion-digging tool.

Materials: One piece of mild steel ⅜ by 1¼ by 18 in.; one piece of iron ¼ by 1 by 9 in.; two ¼ by 1¼-in. soft-iron rivets; two ⅛ by ¾-in. soft-iron rivets; a handle 3 ft. 9 in. long, at least as heavy and strong as a shovel handle.

Procedure:

1. Cut the iron to length with either a hack saw or a cold chisel, or heat it and cut with the hardie on the anvil.

2. Heat one end of the large piece and forge it out fan-shaped to 2½ in. wide and thin it down to a cutting edge.

3. Bend at 2½ in. from the end, to a 1-in. offset as stated in Direction 3 for the dandelion digger.

4. Fasten the handle to the iron, the same as was done for the dandelion digger.

5. Fasten the 9-in. iron with ⅛-in. rivets to the 18-in. piece at the lower end of the handle.

6. Grind or file the tool to a cutting edge.

Note: The iron crossbar may be used to add pressure with either foot or to batter dirt from the roots, if the ground is soft and the roots are pulled instead of being cut off.

PRACTICAL BASKETRY PROJECTS

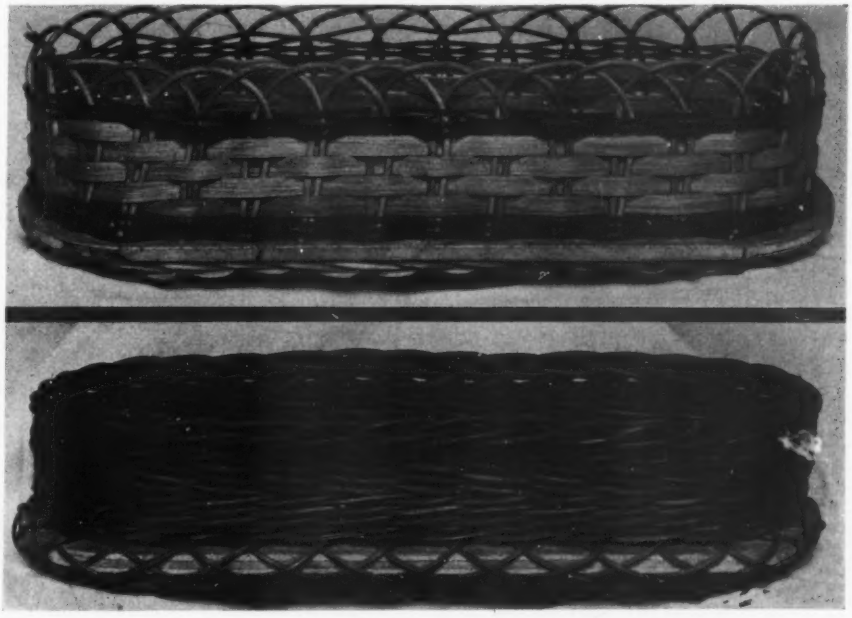
Marjorie A. Spaulding, Phillipsburg, Kansas

No baskets could be more appropriate as school projects than these attractive utility trays, for they introduce a variety of weaving problems which lend interest to the work and yet are so simple that any child can easily master them.

Ways of using the baskets are unlimited. The most obvious school use is as desk trays, for holding pencils, rubber bands, paper clips, crayons, or the many other small things which so clutter an otherwise well-kept desk.

If the trays are made for gifts, the recipient will find use for them as dresser trays, silver trays for buffet, pin trays, card holders, comb-and-brush trays, or containers for kodak pictures. One boy made one to hold his father's tobacco and pipe, while a tiny 5-year-old Miss made one to occupy the place of honor on her father's business desk.

Both styles are made on wooden bases of 3-ply wood, 4 by 13 in. in size with rounded corners, and an odd number of holes bored for No. 4 reed at inch intervals round the edge.



The simpler tray may be made by children who attend the kindergarten or the first grade, though much older children will enjoy making them. The pupils of the higher grades will have much satisfaction in the construction of baskets of the more complicated design with arrowhead trimming, braid border, and covered base. These harder weaves furnish a challenge for fine workmanship which the children love.

To make the more simple tray, which is shown as the upper one in the illustration, cut as many 18-in. spokes of No. 4 reed as there are holes in the base. Soak these spokes in water until they are pliable. Insert them through the holes in the base, allowing 3 in. to project on the side what is to be the under side of the tray base.

Now fasten down the 3-in. ends of the spokes to make a firm base for the tray to stand on. This is done by laying any spoke flat to the base, taking it back of the first spoke to the right, in front of the second to the right, and letting it end back of the third to the right. Repeat around the tray, taking each spoke in turn. At the end, raise the first spokes laid down just enough to slip the last ends into place, so forming a continuous braid. Care must be taken to have each spoke long enough that its end comes at least ¼ in. beyond the third spoke, for this is what holds the border in place.

Turn the basket over after making sure that the braid edge is of uniform width and tension and that all ends are trimmed evenly.

The weaving is done in the simplest manner in *under and over* weave, using colored reed to give interest to the work and beauty to the basket. Red was used on the tray shown in the illustration, with a white trimming band of flat reed, and white spokes.

Insert a single weaver of red, No. 2 reed between any two spokes. Weave to the right, taking the weaver in front of one spoke and back of the next, around the basket. In the second row the weaver will be on the outside of the spoke where it was on the inside in the previous row. If this is not the case, a mistake has been made, and inspection will show that the weaver was laid in front or back of two instead of one spoke somewhere in the weaving. All such mistakes should be corrected, for the pupils should strive for perfection in their work, and anything so enduring as a basket is surely worthy of their best efforts.

Weave four rows of red. Cut the weaver. At one end of the basket insert the white, flat reed and weave with it in the same manner for four rows. Cut it above where it was inserted and begin again with red. Weave four rows and end the weaver by cutting it about 1 in. in length and inserting the end in the weaving, pushing it down beside a spoke.

Make a simple openwork border, which gives an effect of daintiness and charm to the basket. The border is made by cutting all spokes to a uniform length of 5 in., using a piece of reed and measuring each spoke carefully before cutting. Take each in turn back of the first to the right, then in front of the second to the right, and push it down into the weaving on the far side of the second to the right. It is difficult to force the reed into the weaving; insert an ice pick in the opening first.

Cut the spokes in the same manner for the more difficult tray, and insert them in the same way in the base, but the base edge is covered before the ends are fastened down. This is done by using a very moist weaver of No. 2 reed in the color with which you intend to trim the basket. The tray pictured has a yellow background with the edge over the base which we are just ready to make, and the main part of the arrow trimming band of blue. Insert the weaver between any two of the 3-in. spokes, wrap it around the next spoke to the right, then pulling it tightly around the spoke, carry the reed on to the next spoke on the other side of the base, wrap

around it and repeat around the base, wrapping first a spoke on one side then one on the other of the base. Make two rows. This gives a crisscross effect over the edge of the base, which makes a pretty finish and relieves the plainness of the base.

Moisten the spokes, taking care not to wet the base, and fasten them down with a braid as in the simpler basket.

This basket is woven in pairing weave, so called because a pair of weavers is used. Insert two weavers of the foundation color between two successive pairs of spokes at one end of the basket. Carry the left-hand weaver in front of the first spoke to the right, over the right weaver and back of the second spoke to the right to the outside. Then taking the other weaver, which is now the left-hand one, repeat the process. Use this weave for two rows around the basket.

Before making the trimming band of arrowhead weave, count the spokes to make sure that their number may be divided by 3 and have a remainder of 2. If necessary, cut one or two new spokes, 15 in. in length, and insert them beside spokes in the weaving already done. In the following weaving, use each spoke separately. Unless this precaution is taken, you will find that with a remainder of one you will have a perfect arrow on the inside of your basket, instead of the outside. If the number of spokes was exactly divisible by 3, you would have a striped effect with two stripes of blue and one of yellow.

Arrows may be made in any color combination using all three weavers of different colors, or two of one color and the third of a contrasting shade. In the pictured basket, one yellow and two blue reeds were used. Cut one of the weavers already in use, and insert the two blue weavers behind the next two spokes. Now use *triple weave*, taking the left-hand weaver each time in front of two spokes crossing over the other two weavers and back of the third spoke to the right. Weave three rows. Cut all three weavers and insert them again in the same places but from the left instead of from the right of the spokes. Weave three rows left-handed taking the weaver to the right in front of two and back of the third to the left, each time. This reverses the arrow, and gives a pointed effect which reminds one of the shape of an Indian arrowhead.

Cut the three weavers. Insert two of the foundation color and weave right-handed two rows of pairing weave. Cut weavers.

Soak spokes prior to making the braid border. To make the border, lay each spoke in turn back of the next two spokes to the right and bring the end to the outside of the basket. Lace the last two through the first two laid down as you would if the first two were standing. When all spokes are down with ends protruding, take each end in turn in front of two spokes, over the two protruding ends to the right and to the inside of the basket in the same place where the second one to the right came out in the first row. When all ends are on the inside of the basket, make a final row which tucks the ends down out of sight by taking each in turn over the next to the right and holding the end down with the left hand until the next spoke bent down holds it in place.

Trim the ends of the spokes on the inside of the basket so that they are just long enough not to slip out of place. Trim all ends where joints have been made in the construction of the tray, so that they will not show.

MATCH PLATES

C. W. Illingworth, Racine, Wis.

In foundries where large production is required, the pattern equipment is of the best and made so that many castings can be made in a short time. This is done by the use of match plates. Match plates are flat plates made of wood, iron, or aluminum with a number of half patterns mounted on each side. Metal plates are usually ⅜ in. thick and as large as the outside size of a flask. There are also "ears" on each end for flask pinholes. (Fig. 1.) The holes match the pins on the flask.

These match plates are machined, or planed if wood, to the right thickness, center lines laid out, and half patterns put on first one side and then the other. Lines must be very accurately laid out so that the patterns on one side will be exactly opposite from those on the other.

Instead of cutting the gate in the sand for each pattern, a wooden or metal gate is fastened on the match plate. This has a main runner down the center with a gate running to each pattern. (Fig. 2.) Since these gates and runners are fastened to the match plate, they will make the necessary impressions in the sand through which the metal may be poured to the pattern shape.

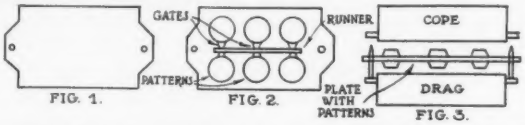


FIG. 1. FIG. 2. FIG. 3.

Sometimes the patterns are cast on the plates as in the case of an irregular parting. If this is done the plates are cast to the correct thickness. The plate and patterns are one casting and merely scraped or filed to correct size.

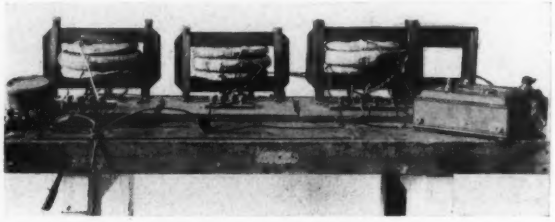
In molding the match plate, an impression is taken from each side of the plate, and the cope and drag are then set together. When the plate with patterns on is drawn away, the two parts of the flask may come together, thus eliminating the plate thickness. Figure 3 shows the cope and the drag being drawn from the match plate. Of course, the drag is turned up when first rammed.

LOW-VOLTAGE TRANSFORMERS FOR TEACHING TRANSFORMER CONNECTIONS

H. R. Goppert, Mishawaka High School, South Bend, Ind.

One of the most frequently used and important pieces of electrical apparatus today is the transformer, but the use of this equipment in the vocational-school shop is too frequently confined to the bell-ringing transformer. For the electrician, lineman, power plant or substation operator, it is very necessary to know something about connecting single- or three-phase power transformer banks, and we should teach the principles of this important electrical device in the school shops.

To use regulation transformers is too expensive, for even small-size power transformers cost a great deal of money.



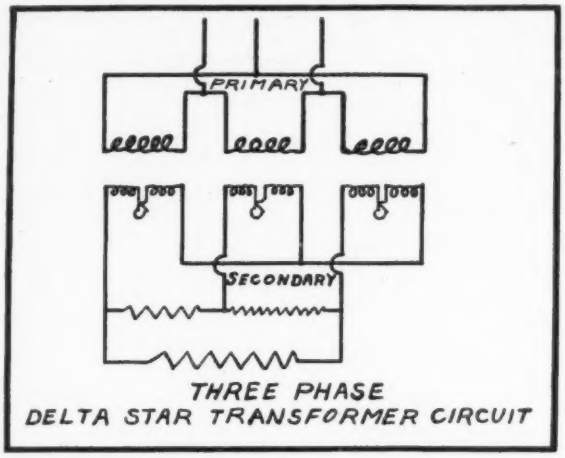
THREE-PHASE, DELTA STAR BANK O FLOW-VOLTAGE TRANSFORMERS AS USED IN MISHAWAKA HIGH SCHOOL ELECTRICAL SHOP

Then too, working with high voltages involves dangers for both pupil and equipment. In the Mishawaka High School electric shop we have worked out a system by which we eliminate the danger and most of the expense. Transformers made in the shop and having 110-volt high-tension coils with two 11-volt low-tension coils are used to hook up all the standard power-distribution circuits. Simple core-type transformers are used and their construction helps teach the transformer principles to the student. One high- and two low-voltage coils are standard for both distribution and transmission use and may be connected for either two- or three-wire single-phase power or two or more transformers may be used for polyphase circuits.

Using three-phase 110-volt power on the primaries of these small transformers, the boys hook up and test all of the common three-phase circuits such as delta-star, delta-delta, star-delta, and star-star banks with no possibility of getting dangerous voltages. The connections on these school transformers are exactly the same as those on the large transformers in the big substations all over the country. By putting meters in the proper places, the student can study the relations between primary- and secondary-phase voltages, primary- and secondary-coil voltages, and phase and coil voltages for each type of transformer bank tested. By this method he not only learns the transformer circuits, but also acquires a basic knowledge of the advantages of each circuit combination, so that he can render intelligent decisions as to

the type of installation that should be used to meet particular requirements in actual service.

A copy of the job sheet used in the shop for teaching three-phase, delta-star transformation is appended. The illustration shows a bank of shell-type transformers with meters placed for reading primary- and secondary-phase voltages.



There are a great many possibilities for testing comparative efficiencies, regulation, and other factors which render each type of installation more or less desirable. These can be worked out by the teacher of electricity as he finds the need for this type of problems.

MISHAWAKA HIGH SCHOOL ELECTRIC-SHOP JOB SHEET

Experimental hook-up and testing of a three-phase, delta-star transformer bank.

Purpose: To study the voltages and learn the connections of a step-down, delta-star transformer bank.

Procedure: Go through the experiment according to the prescribed form.

Connect the primaries first, and then connect one side of each of the secondaries with the others, forming the neutral point. Take and record the coil voltage from neutral to line wire on each transformer. Then take and record each phase or line to line voltage. If the phases do not balance, check them by a vector diagram to find which coil is reversed. Connect this coil in the right direction and take the phase voltages again to be sure they are right. Take sufficient data to be able to answer the following questions:

Questions

What is the ratio of primary-phase voltages to coil voltages?

What is the ratio of primary-coil to secondary-coil voltage in the transformers used?

What is the ratio of secondary-coil voltage to secondary-phase voltage in this method of connecting transformers?

What is the ratio of primary- to secondary-phase voltages or *Ratio of Transformation?*

Discuss the advantages and disadvantages of this method of connecting transformers for distribution of power.

TENONING ON A CIRCULAR SAW

F. W. Voss, Waukegan Township High School, Waukegan, Illinois

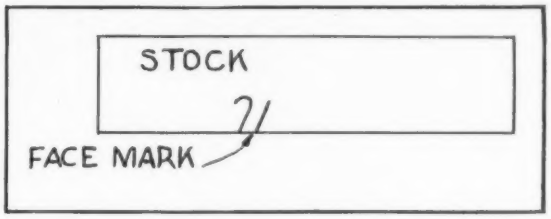
The value of the mortise-and-tenon joint is too widely known to require discussion. We find in school shops that tenons are made on various machines in various ways, and with various results.

After a student has learned how to make a mortise-and-tenon joint correctly and accurately with hand tools, it is not necessary that he make dozens of them by hand, if there is a circular saw available in the shop.

It is obvious that if good joints are to result, they should be correctly made. It is the explanation of a simple and correct method which is taken up in this article.

Method of Procedure

1. Place face marks on the stock, as shown in Figure 1, to designate the face and the edge to be worked from. Without these marks it is a difficult matter to accurately proceed with the tenoning.



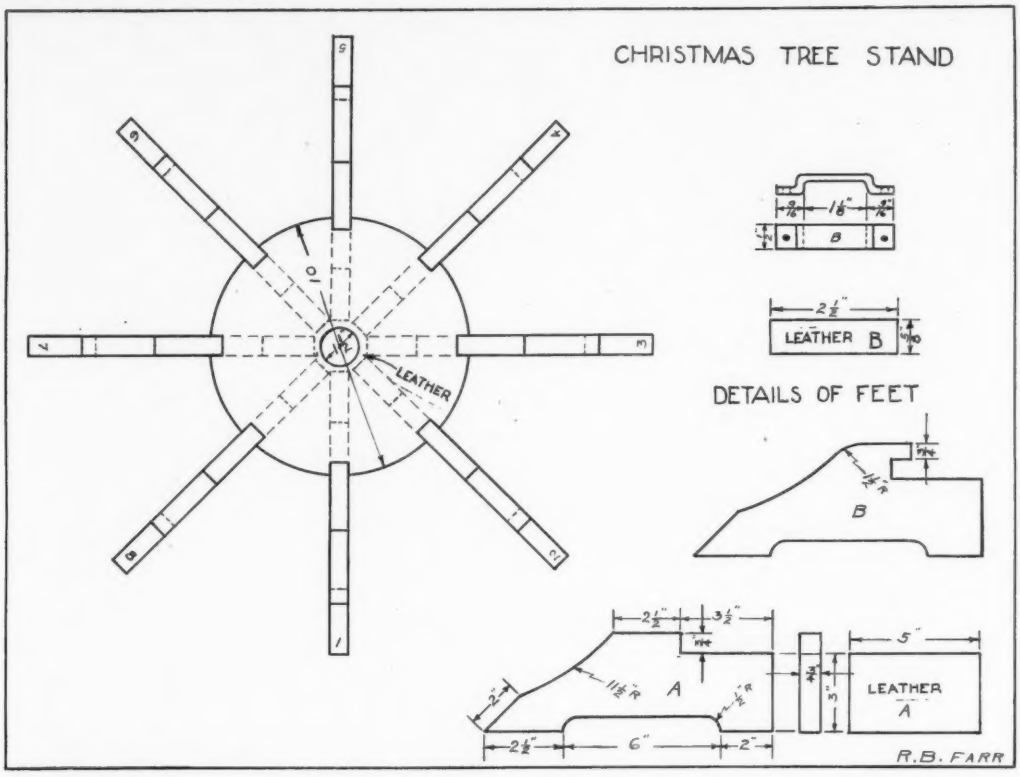
2. With the rip fence placed in such a position that the distance from the fence to the left side of the saw measures the same as the amount of shoulder desired from the face of the stock to the face of the tenon, the first cut may be made, holding the stock on end. (See Figs. 2 and 3.) In making this cut, the face side of the stock should be placed firmly against the rip fence.

3. After all of the tenons have been cut in this way, the rip fence should be moved out so that the distance from the fence to the right side of the saw, measures the thickness of the tenon *plus* the depth of the shoulder from the face of the

FIG. 1, 3, AND 4, READING DOWN FROM THE TOP

stock to the face of the tenon. When the fence has been accurately set in this way, the second cut may be made (Fig. 4), holding the stock on end and holding the face side of the stock firmly against the rip fence.

You will notice that in making both of the cuts illustrated in Figures 3 and 4, the face side of the stock is held firmly against the rip fence. If this method is followed it will insure a good-fitting joint, keeping all of the tenons the same thickness and also keeping the depth of the shoulder from the face of the stock to the face of the tenon the same on all pieces. If there should be any variations in the thickness of the different pieces of stock, that variation will come on the inside shoulder where it will do no harm.



In doing tenoning in this way, it is best to use a combination saw or the outside cutter of a dado head. This will insure a nice clean cut on both faces of the tenon and permit a good fit of all tenons into the mortise.

Care should be taken when cutting the inside and outside faces of the tenon so that no accident results. The stock should be grasped just above the shoulder cut of the tenons in a secure way, so that the stock can be held firmly against the rip fence. Notice the position of the hands of the operator in Figures 3 and 4.

4. When setting the saw for cutting the two faces of the tenon, it should be raised so that the saw is just touching the shoulder of the tenon when the stock is held vertically with the end flat on the table. This will eliminate any cleaning out of the corners, which otherwise interfere with the shoulder of the tenon fittting close down on the stock in which the mortise is cut.

CHRISTMAS-TREE STAND

R. B. Farr, South Junior High School, Everett, Wash.

In schools where Christmas programs are given, the manual-training teacher is often asked to make Christmas-tree stands.

Each grade teacher who gives a program for her pupils wants a Christmas tree in her classroom. This means that several stands have to be made, and the problem returns every year.

Because the stand is to be used for but a short time, anything from a store box with a hole bored in it for the tree, to the type which is made with 2 by 4's with a cross-lap joint and a hole bored in it for the tree, may be found.

The stand presented herewith, not only looks good, but it is a permanent thing after it is once made. There are eight feet as shown in the detail. The feet are made of ¾-in. oak. They are fastened to the 5-in. strip of leather with small nails or tacks, leaving equal spaces between the feet.

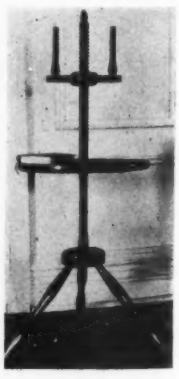
A round oak disc ¾ in. thick and 10 in. in diameter has a 1½-in. hole in the center for the tree. There are eight notches equally spaced around the edge of the disc which fit over the feet and hold them firmly upright.

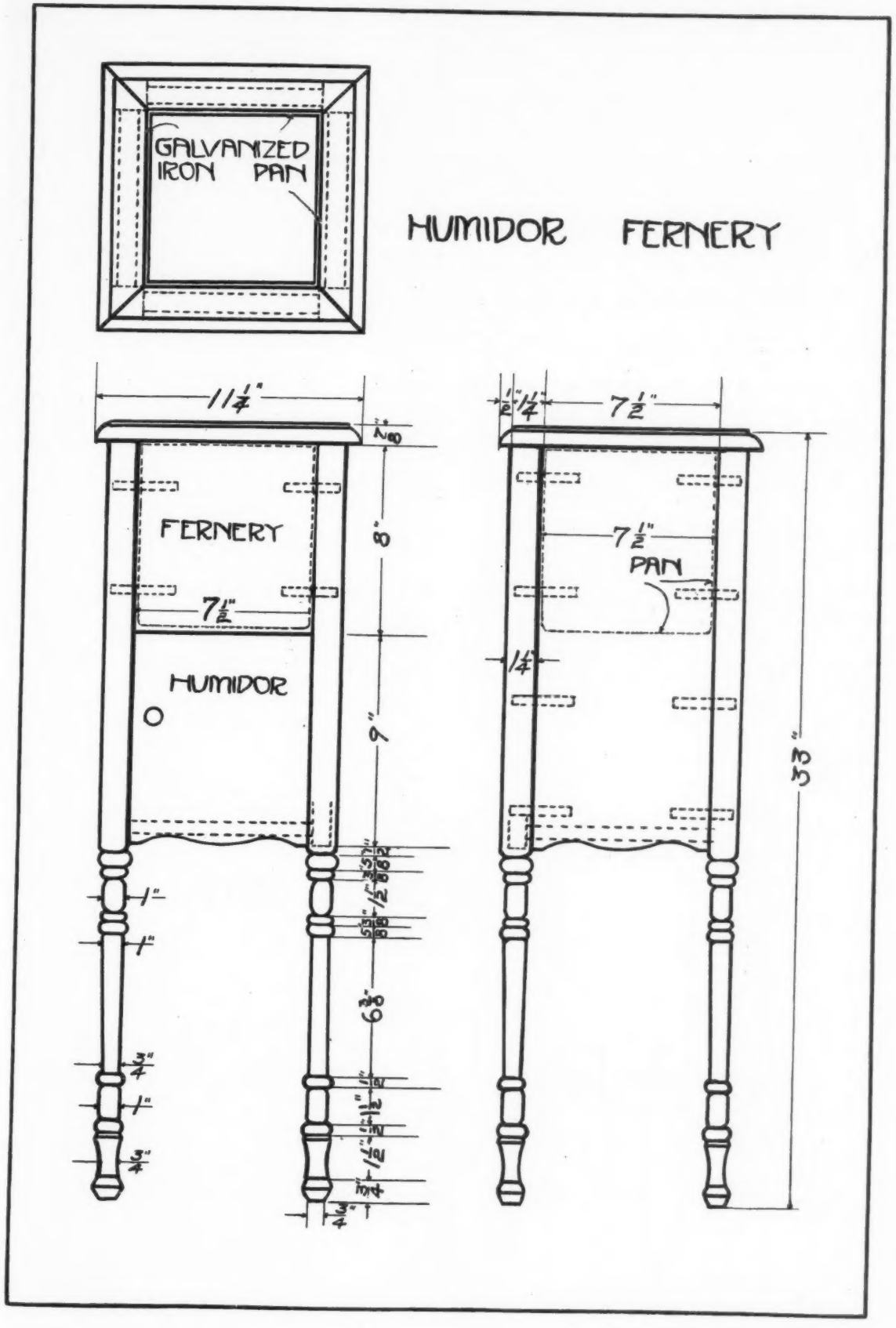
The tree is placed through the hole in the disc and held in place by the leather on the feet. When through with the standard, the disc can be taken off and the feet folded together and laid away for the following year's celebration.

The details given in B are suggested designs for smaller trees. Small metal braces are fastened to the ends of the feet. A leather strap is put through the braces and strapped around the tree to hold it in upright.

A NEW USE FOR OLD-TIME SHOP FURNITURE

The accompanying illustration shows a rather unique piece of furniture. It is a copy of a cobbler's stand which was used in the olden times when candles were the only means of illumination. The circular table formed a support upon which the cobbler kept his tools and supplies. In order to get his illumination adjusted correctly for his work, the crosspiece supporting the two candles would be lowered or raised on the wooden screw. The modern copy of this old bit of shop furniture will now grace a living room as a combination table and candlestick. It was made by W. H. Kuh, a student in the Marinette, Wis., evening schools. The work was done in the cabinetmaking department of the Marinette Industrial and Continuation School, the instructor of which is Wm. F. Schenke.




GALVANIZED IRON PAN
HUMIDOR FERNERY
11¼"
FERNERY
7½"
HUMIDOR
8"
9"
1"
1"
¾"
1"
¾"
6¾"
7½"
PAN
¼"
33"

HUMIDOR FERNERY

A. J. LaBerge, Bryant Junior High School, Minneapolis, Minn.

The humidor fernery, as shown in the accompanying illustration, represents a project somewhat out of the usual type for the industrial-arts shop.

This problem is the result of an effort to combine wood turning, benchwork, and sheet-metal work in one project. It is a new and very interesting problem suitable for ninth-grade boys.

There is nothing especially difficult in the construction of the project, unless it be the turning of duplicate parts, such as the legs.

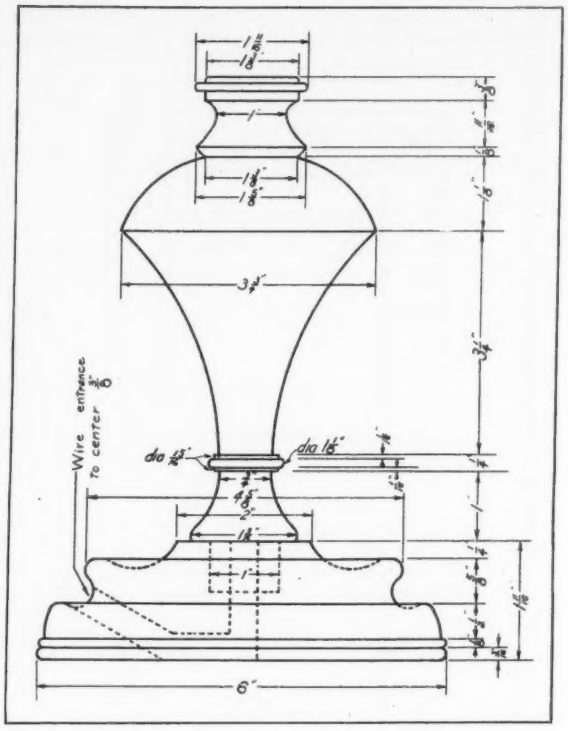
After the preliminary exercises in wood turning have been mastered by the boy, the turning of duplicate parts become a rather simple problem.

There is nothing difficult in the construction of the cabinet, since only dowel and miter joints are used. The frame, which is fastened to the metal pan, adds a great deal to the general appearance and finish of the humidor fernery.

The galvanized-iron pan serves as a container or jardiniere for a fern and can be removed from the cabinet at any time.

The upper part of the cabinet is used as a fernery, while the lower half is utilized as a humidor, the water in the galvanized-iron pan producing the necessary moisture to keep tobacco fresh in the lower compartment.

This project finishes very nicely in walnut, although other materials such as oak and mahogany may be used, according to individual taste or to match the general finish of the room in which the cabinet is to be placed.



A READING OR BOUDOIR LAMP

Frank B. Evans, Cheyenne Mt. School, Colorado Springs, Colo.

The method of making the lamp is simple and economical. The standard should be built up of two pieces 1 by 2 by 9 in. These should have a groove ½ in. wide by ¼ in. deep in the middle of each. When these are glued together the grooves form a hole through the center of the standard ½ in. square. The holes are then plugged with a short plug glued in each end to take the lathe centers. Sufficient blocks are glued on to form the bulbous upper part. Care should be taken to match both end and side grain as end grain is quite pronounced in the upper side of the bulb.

The base may be glued up of two pieces 1 in. thick or may be turned directly from 2-in. stock. The latter is simpler but less economical.

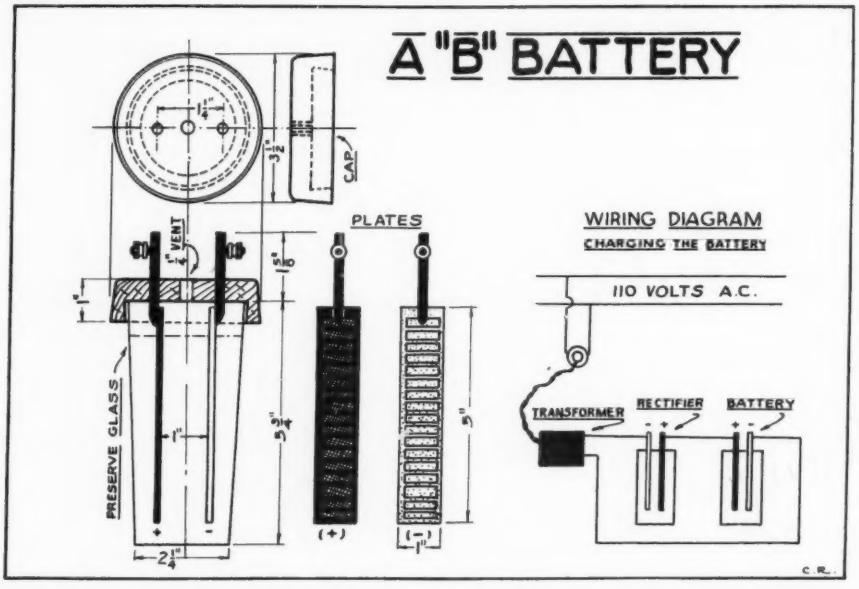
Any good cabinet wood will serve the purpose. The open-pore woods should be stained to the desired color, given a wash coat of shellac, and filled with a very dark filler. The closed-pore woods require no filler.

The lamp may be shellacked, varnished, lacquered, or polychromed. After sanding smooth with very fine finishing paper it should be rubbed with fine pumice or rottenstone and rubbing oil. A very beautiful finish can be obtained by french polishing on the lathe.

A "B" BATTERY

Charles Rice, Everett, Wash.

A simple project that can be made in the woodshop is a small battery which gives 2 volts and 30 amperes, and which can be used for the radio as a B battery or for the electric bell or buzzer. This project may be used to interest the boys in a few electrical principles. The writer believes that originality, initiative, and worthy home membership can be en-



couraged in boys of the junior-high-school age by calling attention to materials that can be worked over into useful products.

The Battery Jar. The battery jar is a preserve glass about 5¾ in. high.

The Battery Cap. The cap for the jar is made of wood. It may be sawed out of ½-in. stock and glued up, or turned up of 1-in. stock. After the cap has been shaped and the holes bored for the vent and the terminals, the cap should be dipped in hot paraffin or soaked with shellac to fill the pores.

The Plates. The plates are made of old cast-away battery plates, that can be found at any battery shop. Cut one section out of a negative plate and another out of a positive plate. This can be done with a coping saw or a hack saw. Scrape a place clean at one end of each plate, apply some soldering flux, and tin the surface that has been cleaned. Cut two pieces of copper-rod stock about 2½ in. long, file a flat surface at one end of each piece, then with plenty of solder and a hot iron, solder one rod to each plate. After soldering, push the copper lug of each plate through the hole in the wooden cap, and solder the binding posts to them as shown in the illustration. Terminals from old dry cells answer very well as terminals.

The cap may be fastened to the jar by pouring melted paraffin in the recess between the jar and the cap. The battery solution may be poured in through the vent if necessary. The solution may be made by mixing 1 part acid (concentrated sulphuric acid) with 5 parts chemically pure water. Keep acid away from tools while mixing. Mix in a glass jar by pouring the acid into the water a few drops at a time. Ready-prepared electrolyte may be obtained from a battery service station, however, and is perhaps the safest way to procure the acid.

In order to give stability to the jar, a base may be fastened to the glass in the same manner that the wooden cap is held in place. Charge with the chemical rectifier that was described on page 446 of the December, 1928, issue of the INDUSTRIAL-ARTS MAGAZINE.

A GOOD STUNT FOR MODEL AIRPLANE BUILDERS

Harry A. Shimmin, Vocational High School, Everett, Washington

A new application of an old principle is a great timesaver in keeping proportions and dimensions accurate, in the construction of model planes or any other models, where full-size dimensions are obtainable.

As an example, a 4-ft. model of a plane which is 4 ft. long, is to be built.

1. A long horizontal line is drawn at the top of the sheet, and from A, using any convenient scale, lay off the total length.

2. A second line extending down at any convenient angle and any scale that will go on your paper, lay off the length of the model that is desired.

3. Turn the paper, by removing tacks, so that B and C will line up with your T square, then tack down the paper in this position.

4. Now, any full-size dimension taken on AB and transferred to AC with the T square will give the correct length of the part desired for your model plane.

5. Only one or two units at A need to be subdivided into smaller units.

6. Any length model can be laid out in this manner, with the assurance that every part of it will possess the right proportions.

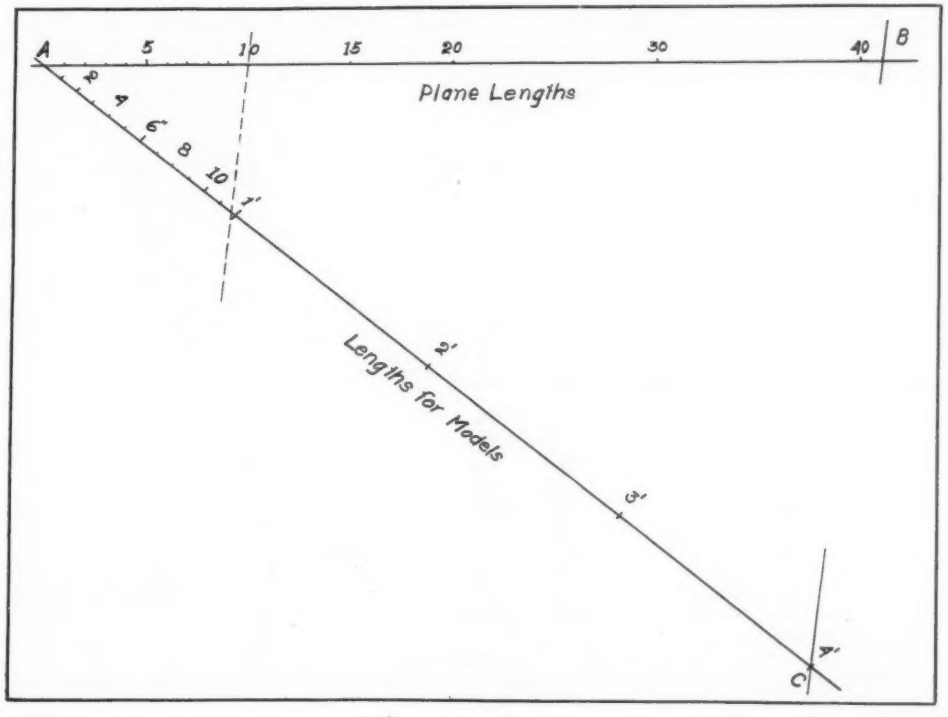
A MECHANICAL, PERSPECTIVE DRAWING BOARD AND T SQUARE

John F. Faber, Academy High School, Erie, Pa.

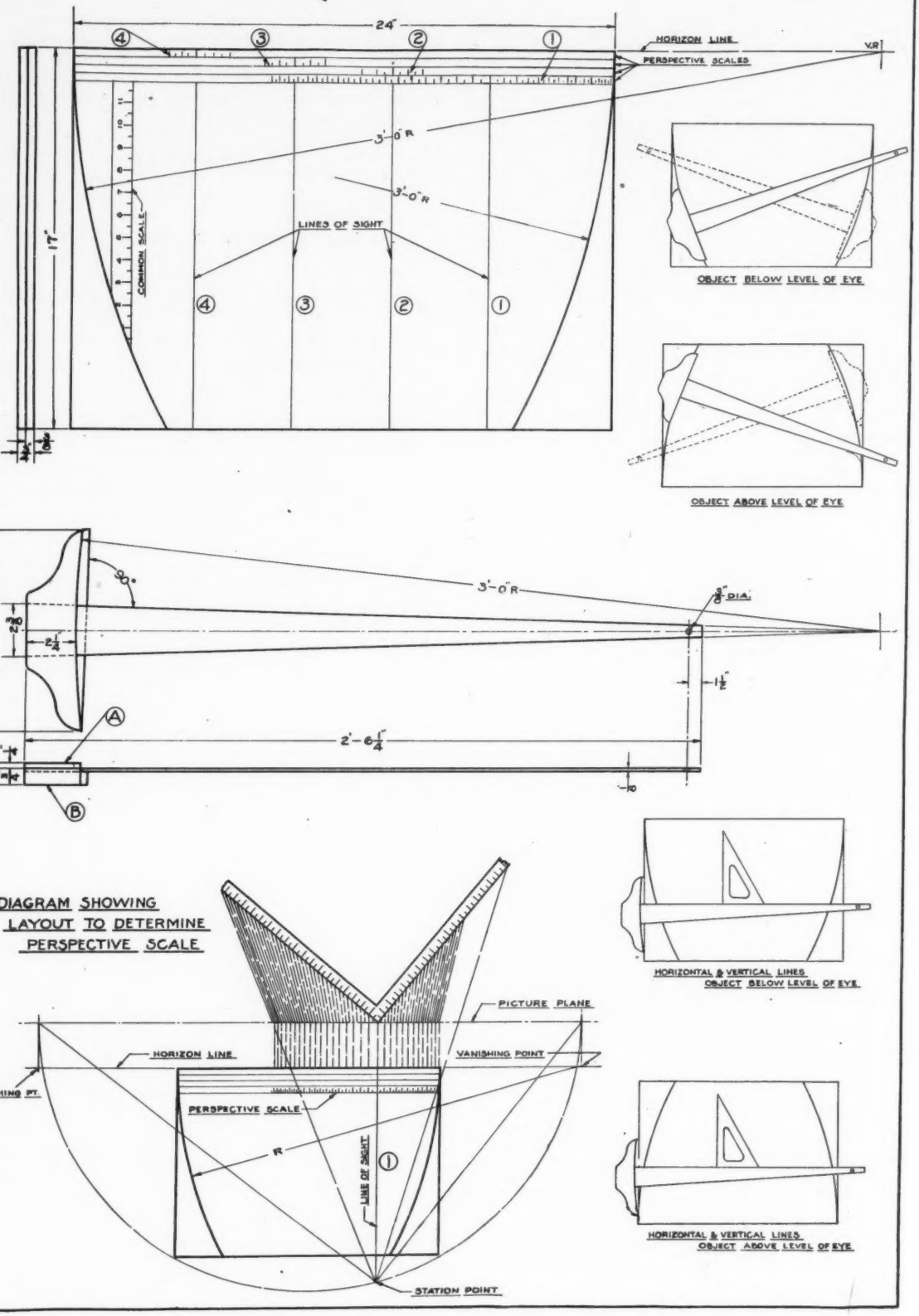
The perspective board and T square shown in the accompanying drawing were designed to enable a student to make accurate perspective drawings in a mechanical manner. Nothing is left to the draftsman or student to infer, thereby eliminating many possibilities of error, provided the board and T square are perfect in construction.

The T square has a double head. A curve is cut on head A of the same radius as the sides of the board. The blade is constructed and fastened to head A so as to make the upper and lower edges of the blade radii (if extended) equal to the radius of the curved sides of the board. The length of the blade is determined by the size of the board upon which it is to be used. Head B on the T square has a straightedge which is to be placed against the straight left-hand edge of the board when drawing horizontal or vertical lines. This head should be thick enough to clear the curved sides of the board, but not so thick as to strike against the table supporting the perspective board. Head B is fastened to the blade so as to make an angle of 90 deg. with the upper edge of the blade as shown in the drawing of the T square.

Four small figures along the right side of the accompany-



—A MECHANICAL PERSPECTIVE BOARD AND T-SQUARE—



ing drawing show the perspective board and T square in different positions while in use.

By turning this board over and using the reverse side for regular mechanical drawings, it can be made to serve a double purpose.

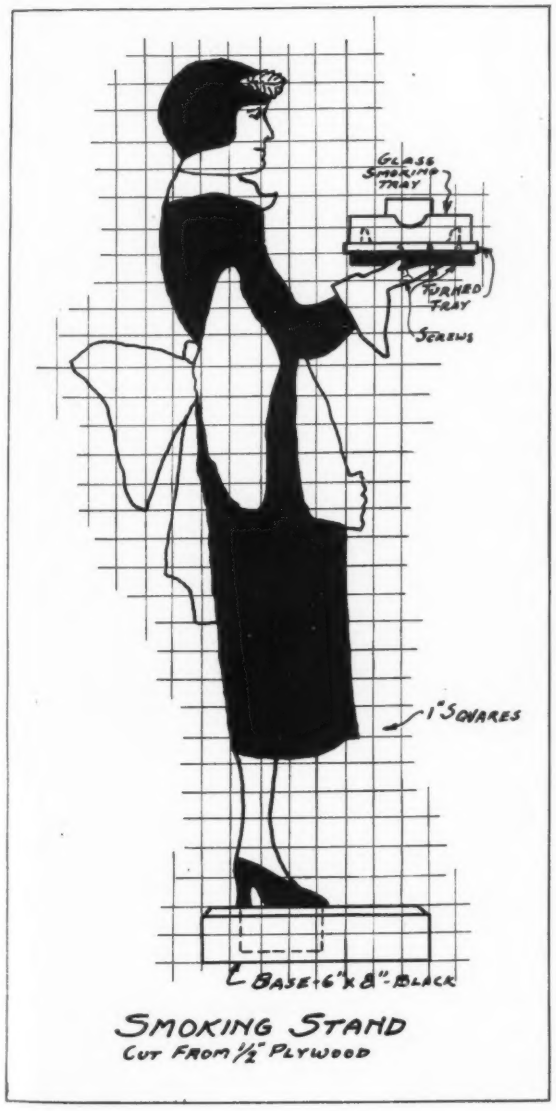
The sizes of the board and T square may be altered to make boards of any desired size. The radius of the curved sides of the board and for T square head A may be determined according to one's judgment concerning perspective. This radius, however, must be the same for both sides.

The method of determining the perspective scales for the different lines of sight is illustrated at the bottom of the accompanying drawing. Any desired scale can be determined in the same manner. The location of the station points and lines of sight can be chosen arbitrarily and the perspective scales for the top edge of the board readily laid out.

A SMOKING STAND

L. M. Klinefelter, Ruffner Junior High School, Norfolk, Va.

This smoking stand can be readily made, but a band saw and turning lathe are needed for best results. The stand is best cut from plywood, the ½-in. thickness being very good. Four or five can be sawed out at one time if desired. Well seasoned lumber may be used, but it is not so strong as plywood. The base is made of 2-in. stock and mortised for a tenon on the foot of the figure. The tray is turned to take the type of smoking tray selected. These trays may be of the 10-cent-store variety. The painting is not difficult since it is in black and white, with the exception of the face which should be given a natural tint.



WHAT IS A GOOD CRAFTSMAN?

The following excerpt, which appeared in the August 20, 1928, issue of The American Architect, was taken from a talk given by Mr. Ludlow, chairman of the Committee on Recognition of Craftsmanship, at a meeting of The New York Building Congress. It contains ideals which should be placed before all shop students.

A good craftsman, first of all, is a man who does first-class work in his trade; he is known by his workmanship; nothing he does is shoddy, ugly, or of poor quality.

A good craftsman is loyal. He is loyal to his union, for he believes that no union man has any right to injure either his union or anyone in it, and he believes that any man who belongs to a club or a society or a union is bound to help that organization along in any way he can.

A good craftsman is loyal to the men of other trades. He never intentionally or wilfully injures the work of another workman. If he is a carpenter, he doesn't draw pictures on white plaster walls, and if he is a plasterer he doesn't drop mortar on a newly laid floor.

A good craftsman is loyal, also, to his employer and the owner, for he knows that he has sold to them his eight hours a day and his skill, and he would no more expect to loaf on the job or do poor-quality work than he would expect his grocer to take his money for a barrel of potatoes and then give him the barrel half full, or the potatoes half rotten.

A good craftsman realizes that buildings are produced by cooperation—cooperation all the way down the line from the owner to the laborer—and he rightly feels that his part in the construction of a building is just as necessary and just as important as the architect's or the contractor's part; he is proud to point out the buildings he has had a hand in building.

A good craftsman, moreover, never forgets to give a word of advice or encouragement to the apprentice or show him how to do a job. He is quick to help his brother mechanic when he needs a hand, and he is the first man to pick up the fellow who meets with an accident. He is never a grouch, and when he is about, things seem to go better on the job.

And, then, a good craftsman is a man with a happy look on his face. Why shouldn't he have a happy look? His day's work is no mere grinding out so many hours for so many dollars; he has given to his work the most precious thing he has—his interest, his skill, his best effort. Every day when he quits, he looks over his work with pride and satisfaction for he knows he has done a good job, and he brings home to his wife and "kiddies" contentment and happiness. Because he is a good craftsman, he is a good fellow, a good husband and a good father, a worth-while man in his community—a good citizen.

Now you and I do not know whether the years ahead of us are few or many, but some day perhaps we shall stand before the Great Craftsman who made all things, and perhaps we shall be asked, "What have you done?" I think the good craftsman will answer, "I did the best work I knew how."

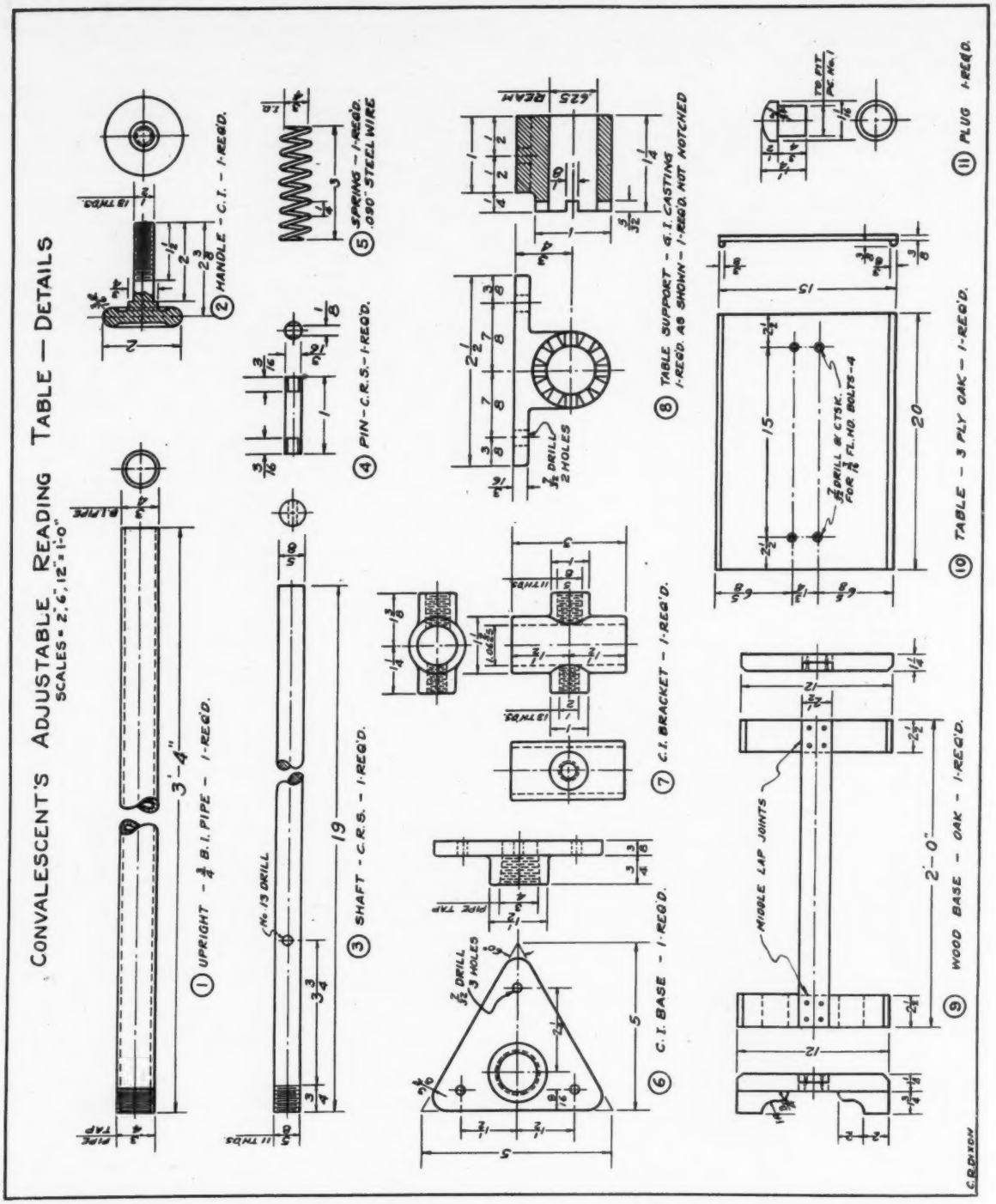
CONVALESCENTS' ADJUSTABLE READING TABLE

C. R. Dixon, Ithaca, N. Y.

This adjustable reading table makes an excellent project for the school shop for at least two very good reasons. As a teaching device it may be used as a community project. It also meets a practical need and this lends interest to the making of it by the pupils.

It may be of interest to relate our procedure, using the community project plan in making up a number of these tables. The work was all done on a production basis.

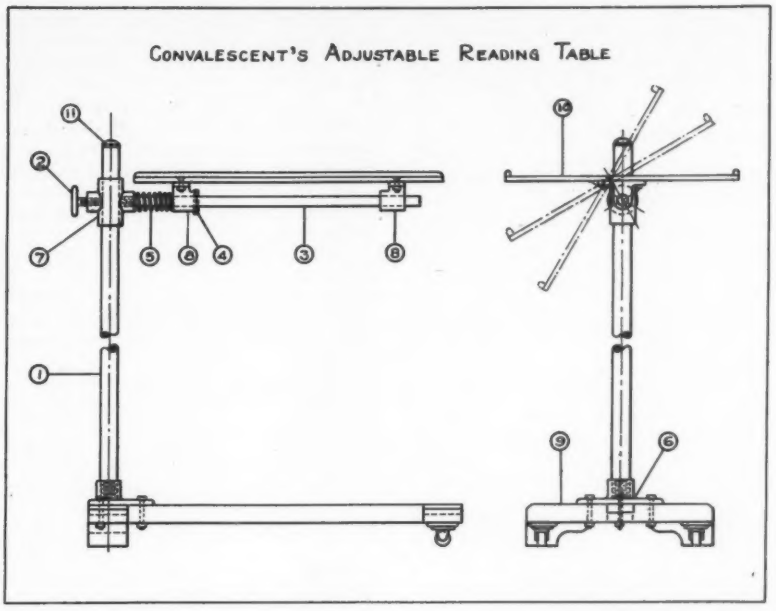
The table proper and the wooden base were made in the woodworking shop. The table is made of ⅜-in. veneer, with ⅜-in. side rails as shown, and the base is made of 1¼-in. oak. The patterns for the castings were made in the pattern shop. All necessary machining was done in the machine shop. It was thought advisable to make drill jigs for the castings to secure uniformity for easy assembling, and this was done in the same shop. Subassemblies were made in some of the


CONVALESCENT'S ADJUSTABLE READING TABLE — DETAILS
SCALES - 2', 6"; 12" = 1'-0"
1 UPRIGHT - ¾ B.I. PIPE - 1-REQ'D.
2 HANDLE - C.I. - 1-REQ'D.
3 SHAFT - C.R.S. - 1-REQ'D.
4 PIN - C.R.S. - 1-REQ'D.
5 SPRING - 1-REQ'D. .080" STEEL WIRE
6 C.I. BASE - 1-REQ'D.
7 C.I. BRACKET - 1-REQ'D.
8 TABLE SUPPORT - C.I. CASTING 1-REQ'D. AS SHOWN - 1-REQ'D. NOT NOTCHED
9 WOOD BASE - OAK - 1-REQ'D.
10 TABLE - 3 PLY OAK - 1-REQ'D.
11 PLUG 1-REQ'D.
C.R. DIXON

shops and the final assembling and finishing were done in the woodworking shop. By using this method, a number of boys were interested in the project and a like number actively participated in its completion.

The upright is made of ¾-in. black iron pipe and has a wooden plug in the top to finish it more artistically. The rest of the material is grey iron casting, cold-rolled steel, ⅜-in. steel spring wire, and the required bolts, screws, etc. The base casting is so designed that it may be bolted to the wood base in such a way as to reinforce the joint at that point. Suitable casters were purchased to make the table easily portable. When in use the table is rigid and stationary.

This particular table or stand was designed to meet a local need which may exist in other communities. We have a Reconstruction Home for the convalescing of those children having had infantile paralysis. The local school board provides a teacher for these children. As they spend much of their time on cots raised at a particular angle with the floor, special furniture is required. As is evident from the illustration, the tables may project over the cots. They are adjustable in height, and also may be tilted at various angles to suit the individual need. The adjustments are simple and easily manipulated. The tables have proved satisfactory for the purpose required, being sturdy, and, what is as important, inexpensive to make.



Another interesting use for these tables was discovered as soon as our printing instructor had seen one of them. He plans to use them as make-ready and forwarding tables. He says they will be ideal for his purpose if fitted with an outboard support, with the side rails removed from the table, and the top covered with zinc. A valuable feature to him was the fact that they take up so little room when not in use.

END TABLE

Jos. J. Lukowitz, Milwaukee, Wis.

(See Supplement No. 121)

The end table in its modern form is a comparatively new problem in woodworking courses. It is very popular with instructors and students, and it is the keen student interest in this problem which gives it so much potent educational value as a problem.

Leaders in education today take cognizance of student interest in every school activity, and seize upon and develop and guide this interest along a directed path striving to make the educational process as pleasurable and interesting to the student as conditions will permit. They know that without student interest their plans and efforts will be not unlike the seed which fell on the rock, despite the fact that when formal discipline was so popular, most of the things which we are trying to get across to the students now by different methods, were gotten across, too. It is not the purpose of this article to discuss the pros and cons of formal discipline methods, for possibly some formal discipline experience will help to form character, and it seems that there will always be enough left in schoolwork which will not yield to any other method.

In the academic work, life situations—past, present, and future—are brought to bear on the subject in hand in order to motivate and vitalize the work as much as possible. However, in creative work, such as the industrial arts, the students are naturally interested in making things that fit into life's surroundings today.

Another point in passing. Every teacher of the industrial arts knows that it is well to get and to hold the interest of the parents of the community, and one of the surest ways of doing this is to make the shop output compare favorably in design and, insofar as possible, in workmanship with the commercial product. This may be done without sacrificing objectives, ideals, or standards of workmanship, and it is often the only visible sign to those outside of schoolwork, of advancement or improvement of industrial-arts courses.

Now for the accompanying end table itself. It has a number of long sweeping curves which recommend it for schoolwork, for there curves are comparatively easy to smooth up with a spokeshave and this the boys like, for they experience a sense of achievement when they see their work progress more rapidly.

BABY'S TOY BOX

E. A. Rerucha, Wakefield Township High School, Wakefield, Michigan

(See Supplement No. 122)

Father and mother have an opportunity to share in the large variety of objects such as bookracks, magazine racks, shelves, etc., decorated in bright colors and with transfer pictures, so why not give the baby a chance, too? The toy box is a useful article and makes a worth-while project for the boys.

The box is made of panel board and decorated with lacquer. A pleasing effect may be obtained by finishing the inside in one color and the outside in another. Transfer pictures of juvenile subjects are added to the outside, or colored pictures, such as are found in all the household magazines, may be carefully cut out along the outline and glued in place with a good grade of glue. When dry, the picture may be given a thin coat of transparent varnish. Care should be taken not to apply too much varnish to the picture as it makes the paper transparent, and if there happens to be any printing matter or another picture on the reverse side it will show.

The accompanying illustrations show how the box is constructed and decorated with lacquer and magazine pictures.

STEEL-BEAM TRAMMELS

Frank S. Hale, Schwab Industrial School, Homestead, Pa.

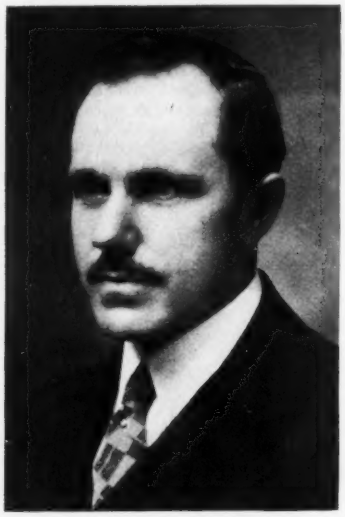
(See Supplement No. 123)

The trammels described herewith are very useful as tools, and also make a very good project. The three lengths of drill rod are milled on one side to prevent them from turning when they are coupled together. The couplings are drilled off center to allow more body for the machine-screw thread. The legs are of tool steel, hardened and ground, and the other details are made of machine steel.

THE SCHOOL CRAFTS CLUB MEETING

The regular meeting of the School Crafts Club of New York City was held on November 21, at the Geneva Restaurant.

Mr. Lawrence Ottinger, of the U. S. Plywood Company, gave an interesting talk on "The Making and Use of Plywood." Mr. Ottinger demonstrated by means of pictures, the remarkable strides which have been made in this industry in the past few years. He explained the various phases of the work, including the preparation of the logs, kiln-drying, gluing methods, and other items. Mr. Ottinger was followed by Mr. Thomas Darling, an instructor in the junior high schools of New York City, who talked on the topic, "Model Boat Building," taking up the problem from the standpoint of educational value and as a hobby. He explained in detail the methods and devices used in boat building, giving some attention to the preparation of plans, gluing, patching, sail-making, and other points.



ARTHUR F. HOPPER
President of the New York School-Crafts Club.

The club held a brief business meeting at which the following officers were elected for the year: President, Mr. Arthur F. Hopper, Plainfield, N. J.; vice-president, Mr. Lloyd F. Stair, Madison; corresponding secretary, Mr. Samuel Tannenbaum, New York City; financial secretary, Mr. David Petrie, Paterson; treasurer, Mr. L. Omar Asher, Livingston.

VOCATIONAL EDUCATION SOCIETY OF BOSTON HOLDS MEETING

The regular monthly meeting of the Vocational Education Society of Boston was held on October 20.

The principal speaker at the meeting was Mr. Erik A. Andersen, assistant superintendent of schools of Providence, R. I., who took for his subject, "The Place of Vocational Education in the Schools of the United States." Mr. Andersen discussed many phases of vocational education, taking up such items as building, equipment, costs, size of classes, testing, and teaching content, giving as an illustration the work accomplished in Providence.

Mr. Andersen maintained that in order to conduct a successful trade school, the industries of a community must be in harmony with the school, and that there must be a constant tie-up between the industry and the school. In order that vocational education may justify its cost, vocational teachers must teach classes of from 25 to 30 pupils each, and the shop teacher's department must be the homeroom for those who come directly under his supervision. He pointed out that the vocational school is not adapted to the backward boy who does not make satisfactory progress, since he retards the progress of the school. Such a boy should be placed in a prevocational class where he can be trained to do a particular job well, after which he may be placed in the industry.

Mr. Andersen holds that vocational teachers must strive to get all the general education possible in order that they may use general education methods in teaching. Cooperative education, he believes, should be on a twelve-months' basis, so that it will not break into the general plan of industry during vacations.

Commenting on the course of study for industrial schools, Mr. Andersen held that vocational instructors may well call upon industry for aid, because many such plants have well-defined courses, with a mass of material which should prove helpful. He cited several automobile companies having these advantages.

In conclusion, Mr. Andersen pointed out that the superintendent of schools should keep in close touch with the industrial leaders, since the shop man has insufficient time for this work. The shop teachers should be given time off to permit them to visit the various manufacturing establishments in order to know what is going on in industry at all times.—*A. P. Hanson.*

THE INDUSTRIAL ARTS ASSOCIATION OF PITTSBURGH MEETS

The Industrial Arts Association of Pittsburgh held a meeting at Herbert's Restaurant on Thursday evening, November 15. The meeting was attended by 85 instructors and supervisors.

The principal address was made by Mr. Raymond A. Tucker, vice-president of the Aircrafts Airways of America, Inc., who talked on "Future Possibilities of Pittsburgh in the Air and the Relation of Aeronautics to Industrial and Trade Education." Mr. Tucker reviewed the accomplishments in the air and showed that the airplane is now used for making maps and for gaining a knowledge of the topography of the country which can be gained in no other way. He emphasized that the industrial-arts teachers have a great opportunity in helping to interest and train young people for the airplane service.

Mr. Tucker was followed by a representative of Gimbel Brothers, who described what his firm is doing to stimulate interest among the boys in aeronautics. A club for boys is maintained. A membership fee of $1 entitles the boys to one hour's instruction each Saturday morning and to the use of an extensive library on aeronautics.

Dr. G. D. Whitney, of the University of Pittsburgh, reported that 500 members had thus far enrolled in the American Vocational Association from Pennsylvania, and he urged the support of every instructor in the direction of an increased number of members.

The club was invited to meet with the Vocational Society of Washington county at Washington, on Monday evening, December 17. Mr. Milo H. Stuart, principal of the Arsenal Technical High School, Indianapolis, Ind., will speak on the topic, "The Blind Leading the Blind."—*Geo. C. Donson.*

TULSA MANUAL ARTS CLUB HOLDS MEETING

At the November meeting of the Manual Arts Club of Tulsa, Okla., Mr. G. B. Willett of the Cleveland Junior High School, recounted his experiences in connection with a visit to some of the well-known industrial concerns of the country. During the trip, Mr. Willett visited such concerns as the Rookwood Pottery, the Globe-Wernicke Company, Fay and Egan, Cincinnati Wrought Iron Works, Yale Lock Company, Yale Hoist Company, Stanley Rule & Level Company, L. S. Starrett Company, Buck Brothers Company, Pexto Company, Studebaker Company, Millers Falls Company, Simonds Saw and Steel Co., Atkins Steel Saw Company, and the South Bend Lathe Company. Among the benefits derived from the trip were a growth in personal knowledge, an intimate knowledge of the various industrial processes, and a fund of valuable information with which to enrich the pupils' experiences.

Mr. G. Ed. Warren, an attorney, and also a carpenter by trade, pointed out that there is an overcrowding noticeable in the ranks of the "white collar" job holders, and that these positions are frequently less remunerative than trade occupations. He predicted that, with the increasing influence of labor organizations and of the type of training which leads

pupils into the trades, more training of the trade type will be demanded of the schools of the future. Vocational guidance, part-time training, and cooperative industrial education, all show a tendency toward a more rapid growth within the next few years.—*J. W. Bollinger.*

EAST TENNESSEE INDUSTRIAL-ARTS MEETING

The industrial-arts section of the East Tennessee Education Association was held October 25 to 27, at Knoxville, Tenn. A total of 35 teachers of the industrial arts and trade education were in attendance representing nineteen junior and senior high schools in that section of the state. The sessions were held at the University of Tennessee and were in charge of Mr. LeRoy Hyder of Morristown.

At the meeting, Mr. H. J. Betts of Knoxville, talked on "The Work Offered in the Junior High Schools," and Mr. C. J. Anderson of Chattanooga, and Mr. C. H. Nave of Kingsport, discussed "The Work of the Senior High Schools." Mr. O. C. Kirkham of Chattanooga, and Mr. C. H. Wilson of Knoxville, took up the matter of the vocational courses in the school curriculum. Mr. Olson Pemberton of Copper Hill, discussed the topic, "The Percentage of Time to be Devoted to Vocational Skills," while Mr. W. C. Wilson of Johnson City, gave a report of the curriculum committee.

A feature of the meeting was a joint luncheon of the vocational groups, representing the industrial-arts, trade and industrial, and vocational agriculture teachers.

The officers elected for the ensuing year are: President, Mr. H. J. Betts, Knoxville; vice-president, Mr. O. C. Kirkham, Chattanooga; secretary, Mr. W. C. Wilson, Johnson City.

WISCONSIN INDUSTRIAL-ARTS ASSOCIATION ORGANIZED

A Wisconsin Industrial-Arts Association was organized on November 9, in connection with the sectional meeting of industrial-arts teachers at the convention of the state teachers' association at Milwaukee. The purpose of the association is to further the interests and to promote the general welfare of industrial arts in the state.

Under the system adopted, the state is divided into six districts, three in the north and three in the south, with a chairman at the head of each. The leaders of each district are expected to meet at frequent intervals to discuss their mutual problems and to work upon some definite group project.

The officers elected for the year are: President, Mr. E. S. Lamoreaux, Janesville; vice-president, Mr. C. W. Byrns, Green Bay; secretary-treasurer, Mr. H. L. Cameron, Appleton.

TEXAS VOCATIONAL AGRICULTURE TEACHERS HOLD MEETING AT SAN ANTONIO, TEXAS

The vocational agriculture teachers of Texas held their annual meeting on Friday, November 30, at the Main Avenue High School, San Antonio, Texas. Mr. K. E. Oberholtzer of El Camp, acted as chairman of the meeting.

Mr. W. R. Sherrill of College Station, talked on "Methods of Teaching in Presenting the Problem for the Conservation and Maintenance of Soil Fertility"; Mr. M. W. Carlton of Pearsall, discussed the subject of "Books, Bulletins, Pictures and Charts Useful in Teaching Conservation and Maintenance of Soil Ferilities"; Mr. L. H. Dennis of Pittsburgh, Pa., also spoke; Mr. R. D. Maltby talked on "Vocational Agriculture"; Mr. J. J. Brown, of the state education department, gave a summary of the national judging contests; and Mr. E. R. Alexander of College Station, talked on "The Future Farmers' Organization in Its Relation to the Vocational Agriculture Program."

NEW OFFICERS OF THE MINNESOTA INDUSTRIAL EDUCATION ASSOCIATION

The Industrial Education Section of the Minnesota Education Association, at its annual meeting held on November 9 at Minneapolis, Minn., elected the following officers: President, Mr. Royal F. Jennings, Minneapolis; vice-president, Mr. F. J. Landon, Minneapolis; secretary, Mr. Victor A. Johnson, Wayzata.

INDUSTRIAL-ARTS CLUB OF MINNEAPOLIS HOLDS MEETING

The Industrial-Arts Club of Minneapolis, Minn., held a meeting at the West High School on November 5. Dr. Roy L. Smith, who was the speaker of the evening, gave an interesting talk on "The Responsibilities of the Teacher in the Building Up of Character." Motion pictures of the Ford Trade School were shown, followed by a short business meeting. At this meeting, Mr. W. B. Titsworth was elected president; Mr. G. E. Hardy, vice-president; Mr. L. A. Thomas, chairman of the program committee, and Mr. R. F. Jennings, secretary.

NORTH DAKOTA MANUAL-TRAINING TEACHERS HOLD MEETING

The annual meeting of the North Dakota Manual-Training Teachers was held November 8, at Grand Forks. Mr. G. F. Billey of Valley City, presided at the sessions.

The following officers were elected for the year 1928-29: President, Mr. Dan Blide, Minot; vice-president, Prof. E. W. Bollinger, University; secretary-treasurer, Mr. G. F. Billey, Valley City.

WESTERN ARTS CONVENTION

The next meeting of the Western Arts Association will be held April 30 to May 3, at Cleveland, Ohio. Miss Mary C. Scovel, president of the association, will preside at the sessions.

The local arrangements committee is making plans for a most interesting program and a fine array of speakers and addresses is being prepared.

STATE VOCATIONAL GUIDANCE ASSOCIATION HOLDS MEETING

The Vocational Guidance Association of Nebraska held its annual meeting on Friday, November 18, at Lincoln, Nebr. The topic for discussion was the new state course of study. Dr. C. A. Fulmer, chairman, Dr. Charles Fordyce of the University of Nebraska, and Miss Harriet Towne, members of the committee, were the speakers.

The meeting closed with the election of officers for the year. Mr. Harvey L. Freeland was elected president; Mr. Mark Caster, vice-president; and Mr. T. B. Goodrich, secretary-treasurer.

The members of the executive committee are Miss Harriet Towne, Mr. S. E. Thompson, and Mr. S. E. Mills.

HOLD INDUSTRIAL-ARTS CONFERENCE AT LINCOLN

An industrial-arts, trade, and industrial conference was held on Friday and Saturday, November 16 and 17, at Lincoln, Nebr. Twenty-two cities were represented at the conference and about 90 men were in attendance.

How to Letter

By Maxwell L. Heller. Cloth, 64 pages. Price, $1. Bridgman Publishers, Pelham, N. Y.

A carefully arranged statement of the principles of lettering with the pen and with the brush. The author outlines methods of letter formation, spacing, etc., and adds a series of practical projects which the student may work out. While the book intends to teach the elements of lettering which the student may apply primarily to show-card writing, the material is ample to give a young man a good start in commercial lettering of any kind.

Build a Winning Model Yacht

By Thomas Moore. Cloth, 256 pages. Price, $3.50. Published by F. A. Stokes Co., New York, N. Y.

The boy who has made small, successful model yachts and who desires to make a big "masterpiece" model will welcome this book quite as much as will the skilled teacher and the experienced adult amateur model builder. For it is a book that tells simply but completely, how to make a variety of genuine racing models, based upon correct principles of marine engineering, refined in hull design and rig, and conforming in every way to the highest standards of construction and finish. The writer speaks with a directness and clearness that reveals his long experience as well as his contacts with the troubles of the average advanced amateur. He is insistent

(Continued on Page 26a)

NOW, ARE THERE ANY QUESTIONS?

Brushing Lacquer on Galvanized Iron and Tin

850. Q.: Will you kindly give me information on the use of brushing lacquer for the finishing of sheet-metal projects of galvanized iron and bright tin? Do these metals require any special preparation in order to retain a firm coat of lacquer?—*F. D. F.*

A.: Galvanized iron does not offer a reliable foundation for paint coatings as my engineering experience in this respect has so many times shown me. Perhaps the best method would be to burnish the metal with No. 2 steel wool, to obtain a reasonable amount of tooth, as the painter terms it; follow with a dip in boiling water containing 1 ounce of Oakite or Tromite per quart, or other commercial metal cleaner to remove all traces of grease, and followed by dipping in hot, clean water and then drying without touching with the hands. For this reason it is advisable to wire the piece in such a manner that it can be easily handled without the necessity of touching it during the cleaning processes. Any trace of skin oil from handling invariably results in spots which ultimately peel after the finish has been applied.

The same treatment should be given the bright sheet tin.

I am not in favor of using brushing lacquer for this work, but for your convenience suggest these methods. Apply a coat of red-oxide metal, oil primer, air-drying type, such as is used for enamel finishes on cars, using a soft bristle, or Fitch brush for its application. Let dry in a warm room for 24 hours. Apply the lacquer by spraying if possible; by Fitch brush with a minimum amount of brushing, if this is necessary. Let each coat dry at least half a day between coats, regardless of the fact that the lacquer is supposed to dry hard in thirty minutes. Give as many coats as desired.

Better results can be had for this work if "four-hour" enamels are used over the metal oil primer after it has dried for 24 hours. These are more tenacious; less liable to cracking and give much better covering per coat as well as having greater brilliancy. The difference in drying time is so little as to make no great difference.—*Ralph G. Waring.*

Gun Cabinet

851. Q.: Can you tell me where I can secure plans for a gun cabinet?—*A. D. M.*

A.: A very fine example of a gun and fishing-tackle cabinet is shown on page 46 of the book on "Plywood Projects," published by the Algoma Panel Company, Algoma, Wis. The book sells for $1.

Finishing Tennessee Red Cedar

852. Q.: I would like to know what to use for a filler on Tennessee red cedar. My boys are making cedar chests now and will have to do some filling.—*R. S.*

A.: The best filler for use on red cedar is the prepared stick shellacs, made by several companies to match both the sap and heartwoods. This shellac is burned in just previous to the final sanding. The hole should be cut clean and free of splinters or whiskers, and then filled slightly in excess of being level by melting the proper colored shellac at a heat which causes the shellac to run without bubbling. This is best accomplished by grinding a small soldering copper to a cone point and heating to the correct heat. As soon as the material has cooled and hardened it should be cut down almost level with a very sharp chisel, and then sanded clean and true with a block and No. 0 sandpaper. Do not use much speed or pressure or the shellac will be partially melted by friction and cause a bad smear.

The second-best choice is the use of a putty made from 1 part white-lead paste and 2 parts whiting, blended with a drop or two of varnish, and colored to match with pigments ground in oil. The matching should be done only after the first coat of finish has dried. The putty should then be glazed in the hole, using a very flexible knife for the purpose, and avoiding any excess material around the spot. Let dry over night and then sand clean and level.

On large display panels, exposed to strong light for eighteen months, we have found that the portion finished entirely in varnish is infinitely richer and deeper in tone than the upper sections on the same panel finished with a priming coat of shellac and several coats of shellac and several coats of varnish.—*Ralph G. Waring.*

Finish for Honduras Mahogany

853.: Q.: I wish to know the best way or kind of finish to put on a Honduras mahogany clock case.—*W. P. B.*

A.: The Honduras mahogany clock case should be stripped with a high-grade varnish remover and then washed with sufficient denatured alcohol to destroy the traces of wax remaining from the remover. Do not follow the remover with gasoline as this tends to dissolve such traces of wax and spread them over the work in a fine film, which usually penetrates the wood and leaves it in such a condition that any subsequent finish has great difficulty in adhering.

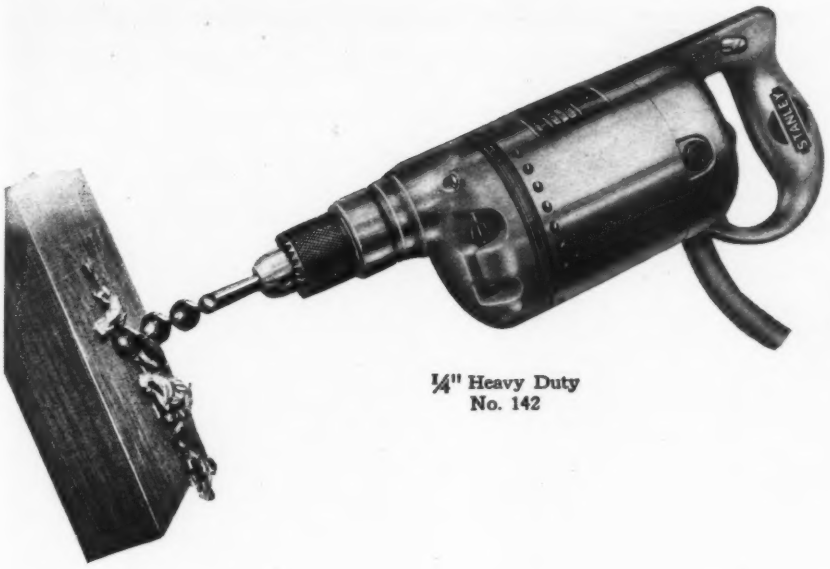
After stripping the case, sand all wood with at least 2/0 sandpaper, 4/0 is better, being very careful to work only in the direction of the grain. Sponge lightly with a clean sponge dampened in warm water. Dry, and resand with worn-out paper from the first sanding job. Dust off and apply a coat of antique mahogany water stain with a good brush. Let dry over night. Reduce a four-pound orange shellac as it comes from the can with at least three volumes of denatured alcohol and apply with a Fitch or soft-bristle brush; let dry to hardness; sand with a split 6/0 garnet finishing paper. Dust off and fill with a rich brown silex filler well cleaned off. Let the filler dry at least 48 hours, dust off and apply a coat of high-grade floor varnish made for long life and durability. Let dry three days in a warm room, then sand clean of nibs with the split 6/o sandpaper used on the shellac coat. Clean off with a duster and a tack-rag and then give a second coat, letting this dry hard clear through. Water sand with a 6/0 waterproof paper, dry, and give a third coat, which should dry a week before rubbing with FFF pumice stone, felt pad, and water. Rub until all nibs are cut down clean and a high-grade surface is produced. Do not do any cross, or circular rubbing, as this will certainly show up in the finish as soon as it is cleaned with a polishing oil. Any carving or intricate moldings should be rubbed with a standard rubbing brush loaded with crude oil and FFF pumice stone. The final rub with the felt may be given with the pad dipped in a mixture of crude oil and water or the pad may be dipped in the water, and then in the oil before applying to the varnish surface. This will give a fine soft effect not otherwise obtainable.—*Ralph G. Waring.*

Two-Toned Finish for Red Gum

854. Q.: Kindly tell me how to finish a quarter-sawed figured red-gum radio cabinet. Do you believe paraffin oil to be a good base for gum? I wish to make the cabinet two toned, that is, part of it, the natural color of the wood, the other stained.—*W. P. B.*

A.: In treating gum with an oil primer, paraffin oil should not be used under any condition. This is a mineral oil, nondrying, and hence will tend to destroy any finish placed over it. If you feel that you must oil the work, use a mixture of equal parts of turpentine and raw linseed oil with one teaspoonful of japan dryer per quart of the mix. I object to oil-base treatments of any sort since the color tends to deepen in time and is not reliable as a base finish for too many reasons to discuss here. Rather use a coat of varnish which can be allowed to sink into the wood.

The preferable method is to use a reliable water stain on wood which has been sanded after sponging. By using two strengths of stain solution, as for instance a 2-oz. per gallon and a 4- or 6-oz. strength these two values will give the desired contrast between the portions designated for this treatment. This followed by a very dilute orange shellac dried and sanded with a split 6/0 sandpaper and then varnished, dried, and recoated as noted for the Honduras mahogany clock case, will tend to give the high-class results this wood deserves.—*Ralph G. Waring.*



¼" Heavy Duty
No. 142

Stanley now offers these new auger bits for Electric Drills. They are especially designed for use with chucks as small as ¼" capacity and are particularly adapted to the high speed of these tools.

Stanley Electric Drills set new standards of performance

This drill and its companions have already established a new and higher standard for electric drill performance.

This is the verdict of manufacturers, mechanics and carpenters who have used the Stanley drills on the hardest jobs.

A Stanley Electric Drill equipped with our Bench or Wall Stand and attachments will make excellent equipment for the Woodworking, Machine, Automotive, or Metal Shop.

Try out one of these drills and attachments in your shop and convince yourself of their performance. Your dealer will be glad to supply you with them.

The coupon below will bring you a copy of our catalog No. S59 which describes the full line of Stanley Electric Tools.

No. 142. ¼" Heavy Duty Electric Drill in No. 532 Bench Drill Stand.

STANLEY TOOLS

STANLEY TOOLS

The Stanley Rule & Level Plant,
Educ. Dept., New Britain, Conn.
Please send me Catalog No. S59 which describes Stanley Electric Tools.

Name_____

Firm_____

City_____ State_____

Points on Drill Grinding

Putting a proper point on the business end of a twist drill doesn't sound hard—but the fact is that 11 pages, or practically 25% of the "Handbook for Drillers," are devoted exclusively to this all-important thing. In reality pointing a twist drill is a delicate piece of work calling for great skill, and much advance knowledge.

If you would like copies of the Handbook for the use of students in machine shop practice, we shall be glad to send them to you, without charge, in any reasonable quantities.

The CLEVELAND TWIST DRILL COMPANY CLEVELAND
NEW YORK-CHICAGO-LONDON SAN FRANCISCO
TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES

(Continued from Page 47)

that the would-be builder shall master the principles, as well as the procedure of design, and shall apply at least the essential mathematical formulas which insure correct weight, balance, and good sailing qualities. He urges a very limited number of tools and simple equipment but he calls for the best and most suitable materials. He overlooks no kinks that will help in construction, but he does not permit short cuts that will lessen the real value of a model. The typical plans include twelve distinct models, including three splendid power boats. Complete working drawings and details are provided.

Part-Time Cooperative Industrial Education in the Philadelphia High Schools for the Year Ending September, 1928. Prepared by Mr. C. F. Bauder, director of industrial arts, under the supervision of Supt. E. C. Broome. Paper, 17 pages. Issued by the board of education of Philadelphia, Pa. The pamphlet describes and illustrates the training plan in operation in the high schools for the training of students in architectural drafting, automobile repair, electricity, machine-shop practice, mechanical drawing, and woodworking trades.

How to Make Children's Clothes the Modern Singer Way. Paper, 64 pages. Price, 25 cents. Singer Sewing Machine Co., Singer Bldg., New York. A book designed to make sewing for children easy, and to encourage those who sew for children to appreciate the importance of correct and becoming attire. The garments illustrated represent types that are generally in favor, and the instructions given can be applied in the use of any favorite make of pattern.

Study of Rehabilitated Persons. Paper, 41 pages. Bulletin No. 132, June, 1928. Issued by the Federal Board for Vocational Education, Washington, D. C. A report of a statistical analysis of the rehabilitation of 6,391 persons. The report covers the objectives of the study, the scope, and the extent of the investigation, the methods used in conducting the work, and the general data secured in statistical form.

Forests and Water in the Light of Scientific Investigation. By Raphael Zon. Paper, 106 pages. Price, 20 cents. Issued by the Government Printing Office, Washington, D. C. This paper brings together impartially all the scientific facts in regard to the relation of forests to water supply. It takes up such topics as effects of forests upon climate, total amount of water lost to streams, effect of forests in mountainous regions, severity of rainfall, forests and erosion.

TEXAS TEACHERS HOLD SUCCESSFUL MEETING

As indicated in the advance program announced in the December Magazine, the Texas Industrial-Arts and Vocational Education Sections met in San Antonio on Nov. 29 and 30, and Dec. 1.

On the main convention program, L. H. Dennis, assistant state superintendent of Pennsylvania, ably represented the several branches of practical-arts education, speaking before several thousand delegates on the subject of "The Place of Vocational Education in a Democratic System of Education." In a similar way Miss Anna E. Richardson represented the home-economics groups with a discussion of parental education.

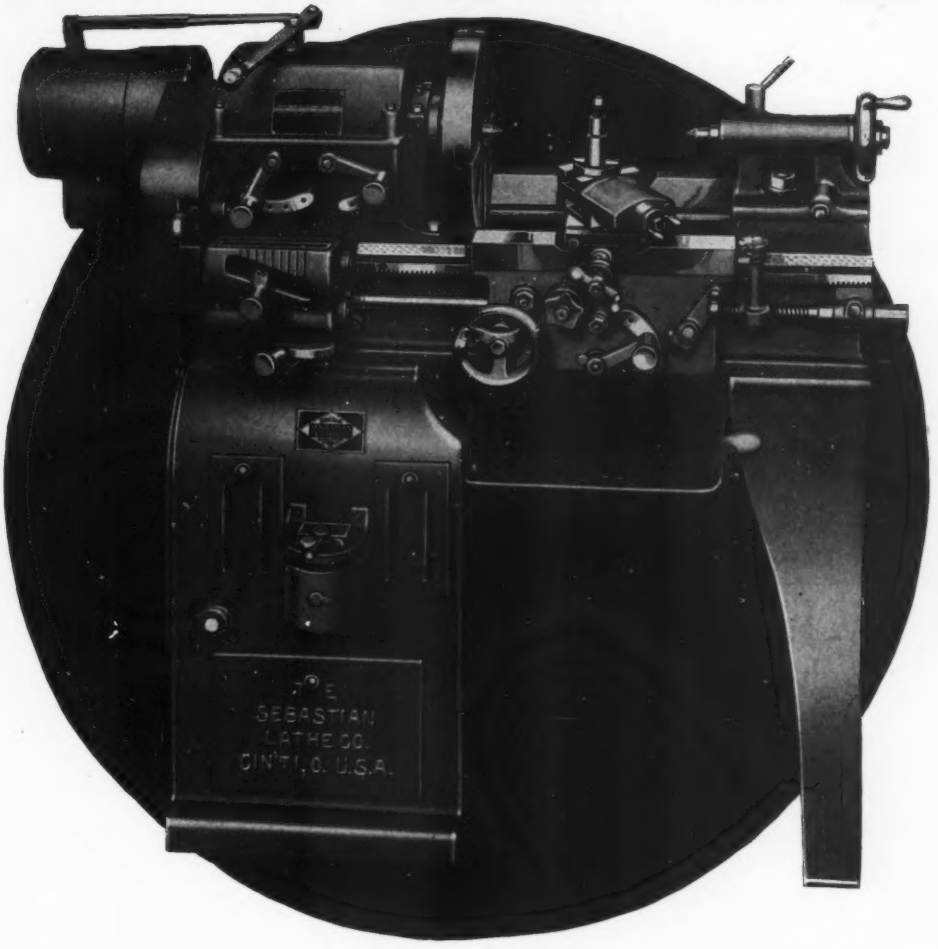
On Friday morning the Texas Vocational Association met for their annual business session. Among other transactions, the constitution of the association was revised and adopted to include the industrial-arts teachers as a definite part of the membership groups. The annual T. V. A. breakfast was held on Saturday, at which time Miss Anna Richardson, L. H. Dennis, State Supt. S. M. Marrs, and Mr. Moffett of the Federal Board addressed the group.

Officers for the coming year in the T. V. A. were elected as follows: Miss Mabel McBaines, Houston, president; and Mr. J. J. Brown, Texas State Department of Education, secretary-treasurer.

Officer selected in other sections are as follows: Industrial-Arts, N. M. Pitman, instructor in printing, San Antonio, chairman; R. V. Rust, secretary. The officers elected for the Trades and Industries Section are C. C. Rigney, Arlington, chairman, and R. L. Martin, secretary.

At a conference of vocational directors presided over by State Director N. S. Hunsdon, practices were established for future coordination work.—*Victor J. Smith.*

IN YOUR NEXT REQUEST FOR BIDS—



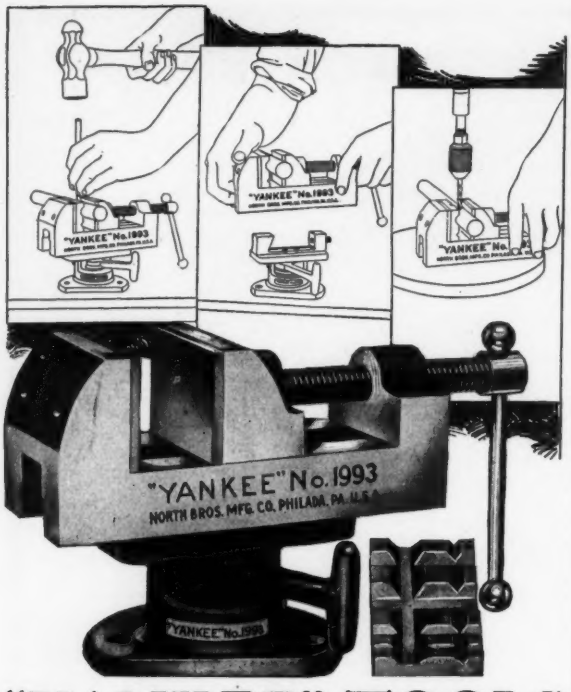
Incorporate these Specifications

(....) Lathes Gold Seal or equal—Swing 11", bed length 4', to be 8 speed geared head, full quick change box with no loose gears, to cut threads 3-96, feeds .007 to .156, all steel gears, $1\frac{5}{16}$" hole through spindle, collet capacity $\frac{7}{8}$", bearings of main spindle $2\frac{5}{16}$x$2\frac{3}{4}$ — $1\frac{1}{8}$x$2\frac{1}{4}$", to be taper gibbed throughout, motor drive with motor fitted in leg under headstock with a tool cabinet in the leg below the motor compartment, tumbler yoke for cutting left-hand threads with the depth of the teeth already adjusted on the quadrant for throwing over to a left-hand thread, lathe to be bronze bushed wherever required. Macit tool post screw. Silent chain drive with easy adjustment for stretch in the chain, lathe to be fitted with a safety shearing pin, graduated compound rest and tailstock bases, tailstock center oiler, friction type collars on compound rest and cross feed with these collars graduated, accuracy alignment test .0005, motor and control to be (Specify here type current used and type of control wanted). Each lathe to be furnished with a chip pan, depth thread chasing stop, centers, thread chasing dial, steady rest, and wrenches. The lathes shall all be furnished with all gears guarded by cast iron guards, and the operation of the lathe for stop and start shall be through a friction on the headstock controlled by a lever within easy reach of the operator so that the motor can run constantly when machine is in operation. The apron of the lathe shall have a safety device to prevent both longitudinal feeds being thrown in at the same time.

Add here list of extras wanted such as, Chucks, Taper Attachment, Draw-in Attachment, Collets, Tools, Dogs, etc.

The Sebastian Lathe Co., Cincinnati, Ohio

Room 372—50 Church St., New York City



"YANKEE" TOOLS

teach efficiency

TIME and labor are saved; mistakes are prevented, by the "Yankee" Vise. Lock up the work, mark it, remove the "Yankee" Vise from its base and take it to any part of the shop—holding the work for drilling and machining.

Bottom, sides, ends, are machined true. In any position, the "Yankee" Vise gives perfect alignment. Use it as a jig.

"Yankee" Swivel Base with cam-throw lever locks in any position. Hardened steel block, with V-shaped grooves, holds rounds or irregular shapes.

Every school shop needs "Yankee" Vises—for special uses, supplementing the vises in ordinary use.

"YANKEE" Vise Removable from Base

No. 1994. — Jaws open, 4 inches.
No. 1993. — Jaws open, 3⅛ in.
No. 1992. — Jaws open, 1⅝ in.
No. 1991. — Jaws open, 1½ in.

Prices from $3.75 for the smallest size, up to $18.25 (f.o.b. Philadelphia) for the largest.

HELPFUL TOOL BOOK, FREE

Describes all the "Yankee" Tools with many illustrations of the ingenious ways they save time and labor. Quick-Return Spiral Screw-drivers, Two-speed small Hand Drills, Automatic Bench Drills, Ratchet Tap Wrenches, Etc. Write us for it.

North Bros. Mfg. Co., Philadelphia, U. S. A.

"YANKEE" TOOLS

Make Better Mechanics

Miss Agnes Averyt of Birmingham, Ala., has been re-elected as head of the home-economics department of the Wewahitchka High School in Gulf county, Florida. Miss Averyt has completed two years of service in the home-economics department.

Mr. Everett Wood, formerly teacher of industrial arts at Warrensburg College, Warrensburg, Mo., has become an instructor in a high school at Clayton, Mo.

Mr. A. G. Norris has been appointed supervisor of industrial education at Springfield, Mo.

Mr. Frank W. Walsh, instructor in drawing at the State Teachers' College, Oshkosh, Wis., recently completed his work for a master's degree at the University of Iowa. Mr. Walsh submitted a thesis entitled, "The Use of Mechanical Drawing."

Mr. Ben E. Harris has resigned the position of supervisor of industrial education with the state education department of Alabama, to accept the position of assistant supervisor of industrial education at the University of Alabama.

Mr. Harris will continue in vocational-trades work as a field representative of the state board of education and as a member of the teacher-training staff of the University.

Mr. R. R. Schmitz, who formerly held the position of assistant supervisor and itinerant teacher trainer of industrial education in Alabama, has been transferred to the work of training junior-high-school teachers in the University of Alabama.

Miss Olga Bird, formerly domestic-science instructor at Yale, Mich., has resigned to accept another position in Jackson county.

Mr. H. L. Shattuck has been reappointed as president of the corporation of the North Bennet Street Industrial School, Boston, Mass. Other officers are: Mr. Henry V. Greenough, Mr. James P. Munroe, and Miss Mary E. Williams, vice-presidents; Mr. R. G. Fessenden, treasurer, and Mr. F. W. Hunnewell, clerk.

Mr. W. H. McKinney, formerly of the Waco High School, Waco, Tex., has been made head of the newly organized trades school department in the county schools.

Mr. Percy Angove, formerly state supervisor of vocational rehabilitation in the Michigan department of education, has accepted a position as assistant superintendent of education in the Wayne County Training School at Northville.

Mr. H. O. Brainard, manual-arts instructor at Morris, Ill., has been given a year's leave of absence in order that he might take a course in the college of law of the University of Illinois.

New Vocational Course at Fond du Lac, Wis. A course in acetylene welding is being offered in the night classes of the vocational school, Fond du Lac, Wis.

New Vocational Workshop at Monett, Mo. The school district of Monett, Mo., has approved a bond issue of $7,500 for building and equipping a vocational agriculture workshop.

Conduct Class in Furniture Refinishing. The vocational night school at Newton, Kans., is conducting a class in furniture refinishing in the manual-training shop of the high school.

Trade Classes at Green Bay, Wis. The trade and industrial courses offered at Green Bay, Wis., include automobile mechanics, machine-shop practice, drafting, electricity, woodworking, paper chemistry, plumbing, painting and decorating, foremanship, and safety.

Trade Classes at Pratt, Kans. New evening trade classes for men are planned at the high school, Pratt, Kans. The work offered will comprise automobile mechanics, carpentry, show-card writing, and other subjects for men employed in the trades.

Less effort—yet, better standards

SURELY every teacher takes pride in watching a class progress to a high marking average. It is surprising to note how Kester Solder will enable a group of boys to do soldering that will compare with the work of a skilled mechanic.

Kester, by eliminating the acid pot, eliminates the uncertainty of soldering. A scientific flux inside this hollow wire of solder flows to the job as heat is applied. Immediately after, the bright solder melts and forms a bond, neatly, subtantially and quickly.

Send for samples of Kester and see the renewed interest your boys will take in their soldering projects.

KESTER *Self-Fluxing* SOLDER

[Trade Mark]

Kester Acid-Core Solder
1, 5, 10 and 20-lb. Spools
For General Work

CHICAGO SOLDER COMPANY, 4259 Wrightwood Ave., Chicago, Ill.
Gentlemen: Please send the following number of working samples:

.....Kester Acid Core Wire Solder .....Kester Rosin Core Wire Solder

The number of boys in our shops are: General Shop..... Electrical.....
Sheet Metal ..... Home Mechanics.....

Signed.....

Instructor in..... School.....

City..... State.....

Kester Rosin-Core Solder
1, 5 and 10-lb. Spools
For delicate Electrical Work

School Shop Equipment News

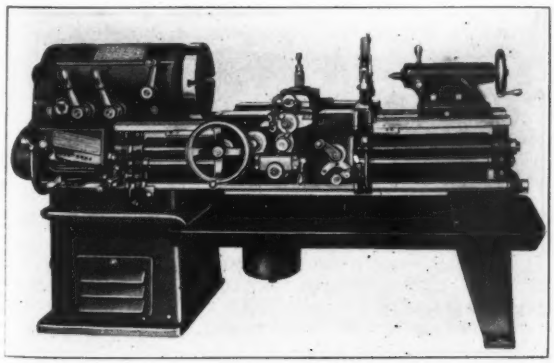
For the Supervisor and Teacher who desires to keep abreast with news of new Machinery, Tools, Supplies, etc.

NEW REED-PRENTICE SLIDING GEAR-HEAD LATHES

The Reed-Prentice Corporation, of Worcester, Mass., has announced the marketing of its new 14-in. and 16-in. sliding gear-head lathes for use in school shops.

The Company has issued a four-page circular describing and illustrating the new lathes, which have been designed for maximum production with the utmost accuracy, insuring the closest precision and finish for toolroom purposes.

The machine has a headstock with nine gears for eight spindle speeds and a safety interlock for preventing the engagement of conflicting gear ratios. The gears are of nickel chromium, S.A.E. No. 3250 electric-furnace steel, hardened to Rockwell test of C-55 to 58. The gears run in a bath of oil and a sight oil-level gauge is provided.



THE NEW REED-PRENTICE LATHE.

The spindle is constructed of S.A.E. No. 3140 heat-treated nickel chromium alloy steel, running in a four-bearing precision Timken mounting, with rear bearings mounted on a snugly fitted floating sleeve to guard against slight variations in spindle and housing caused by temperature changes. The thrust is taken on the front bearing.

A "twin disc" clutch is mounted within the main drive pulley for starting and stopping the head spindle. It has one point of adjustment, which is easily accessible, and is operated by levers at quick-change bank and apron, one of which is always within convenient reach of the operator. A reverse movement of these levers applies a brake which quickly stops the spindle.

The quick-change gear box incloses gears which are made of high manganese alloy steel providing 41 changes of feeds and threads. An easy-reading cast-bronze index plate for speeds and feeds is attached to the front of the gear box, while an end gear permits additional changes in compounding for coarse and metric threads.

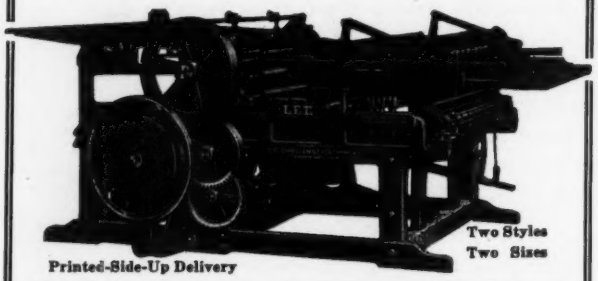
The tailstock is of the two-bolt type, with lateral adjustment for taper turning, an improved type of binder with equalizing action, and has a device for locking the spindle securely.

The apron is a one-piece box casting, of the double-support type, a central oil reservoir, and bronze-bushed bearings. A lever operates a double-disc clutch for cross or longitudinal feeds, and an interlocking device prevents the engagement of feeds and threads at the same time.

For further information, address the Reed-Prentice Company at Worcester, Mass.

(Continued on Page 32a)

A Simplified and Economical Press



Made in Two Styles: Carrier Delivery and Fly Delivery

No. 38 Lee; Size of Bed 26x38; Size of Form 22x35; Size of Sheet 24x36
No. 42 Lee; Size of Bed 29x42; Size of Form 25x38; Size of Sheet 26x40

Both sizes of Lee Presses are built with Carrier Delivery, but the 24x36 inch size is made in both Carrier and Fly Delivery styles.

Equipped with Counter, Jogger, Cast Rollers (form, rider and angle), Quick-Stop Brake, Trip, Micrometer, Feed-Guides, Hard Packing, Tools, Oilers, Etc.

THE LEE TWO-REVOLUTION PRESS is a Versatile and Economical Press—because of its quick adaptability to handle a large range of work, from a small circular or single letterhead to the highest grade of commercial work in one or more colors; fine register and distribution; rigid impression and sturdy construction; built-in durability and handsome appearance; economical first cost and low upkeep, for its general dependability.

Send for full information regarding the Lee Press and ask for literature describing any of the following machines and utilities used throughout the world in the Graphic Arts:

Diamond Power Paper Cutters
Advance Lever Paper Cutters
Hoerner Combination Type-High Machine
Mercantile Addressing Machine
Sieber Adjustable Hand and Foot Punches
Challenge Proof Presses
McGreal Combination Printers' Chases
Challenge Labor-Saving Iron Furniture
Challenge Mammoth Iron Furniture
Challenge Notched Iron Furniture
Challenge Semi-Steel Imposing Surfaces
Challenge Pressed Steel Galleys
Challenge Rigid Rim Galleys
Challenge Iron Sectional Blocks and Hooks
Challenge Type-High Gauges
Challenge Quoins and Keys

The Challenge Machinery Co.

GRAND HAVEN, MICH.

Chicago, 17-19 E. Austin Ave. New York, 200 Hudson St.

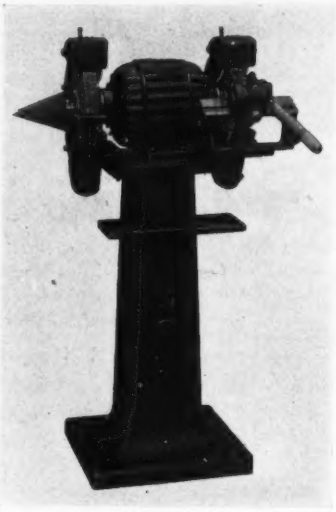
See our SPECIFICATIONS in BRUCE'S SPECIFICATION ANNUAL INDUSTRIAL ARTS & VOCATIONAL EDUCATION EDITION

NOTE—A handy brass-edge Printer's Gauge, showing 6 and 12 points and inches, sent free.

(Continued from Page 31a)

NEW BLOUNT ALL-PURPOSE TOOL GRINDER

The J. G. Blount Company of Everett, Mass., has placed on the market an all-purpose tool grinder which is easily adaptable for the woodworking or general school shop. It is provided with three wheels and meets a variety of needs. A coarse wheel 10 by 1½ in. is provided for general shop use, and a fine wheel of the same size is for grinding tools, chisels, and plane irons. A special rest has been installed on the wheel, which is fully adjustable as to angle with the wheel face, and to which is fitted a screw-feed, sliding clamp block for holding the tool and guiding it straight across the wheel. This device insures the rapid grinding of tools to correct angle and curve, and a grinding cone is used for grinding gauges and inside-curved tools.



THE NEW BLOUNT GRINDER

The grinder is of the motor-in-head type and is fully inclosed and dustproof. The spindle is extra heavy and runs in heavy-duty deep-groove ball bearings, while the double recessing of the flanges offers a double seal against grit and dust in the bearings or motor. The motor operates with a very low current consumption. The wheels are provided with safety guards, and the entire machine embodies those phases of simplicity, ruggedness, and safety, which are the keynotes of good design and construction.

NEW PEXTO CATALOG OF TOOLS FOR AUTO BODY AND FENDER REPAIR

The Peck, Stow & Wilcox Company of Southington, Conn., has issued a four-page circular illustrating and describing a variety of tools for use in automobile body and fender repair. The tools represent a good assortment for automobile repairs and are inclosed in a convenient carrying case especially adapted to shop use or for salesman's sample case.

The firm also makes a very practical steel tote tray, which has a collection of small and large tools for general garage use. It is equipped with a rolled metal handle and weighs only 6 lb. when empty.

Complete information and price lists about these automobile tools may be obtained by writing to the Peck, Stow & Wilcox Company at Southington, Conn.

HOW TO BUILD CLOCKS

The American Chime Clock Co., of Philadelphia, Pa., has issued a circular illustrating and describing the construction of a banjo clock. The firm offers to send a complete set of plans and parts for a banjo clock to any school-shop instructor who will send $6.75.

Complete information may be obtained by writing to the American Chime Clock Co., at 1669 Ruffner St., Philadelphia, Pa.

(Continued on Page 34a)

CONFIDENCE

A recent survey shows that during the school year of 1927-1928 a larger percentage of the printing materials sold to schools in the United States was furnished by the American Type Founders Company than by any other firm.

WHY?

The answer is: Because of selling only the highest quality of merchandise, rendering superior service and furnishing professional cooperation. These factors, by inspiring confidence in the minds of the school board, superintendent and supervisor, have enabled the American Type Founders Company to rise above the mere competitive method of selling to schools.

Printing Materials

The materials offered for sale by the American Type Founders Company for school purposes are identically the same in quality as are generally installed in modern commercial printshops.

The American School Type Cabinet No. 9178, the American School Imposing Table (two sizes) and the American School Pressroom Cabinet have been especially designed to facilitate instruction and to accommodate the comparatively small stature of school pupils.

Century Schoolbook type was designed according to specifications laid down by leading scientific authorities. It is the most legible type face ever made and considerable quantities have been sold to schools. Its use relieves the school authorities of a great responsibility in the care of children's eyesight. Hundreds of other type faces designed and produced by the American Type Founders Company offer a wide range of selection.

The American Type Founders Company has Selling Houses in most large cities. This affords the school executive close contact with the Company and prompt delivery of materials.

Service

The Education Department of the American Type Founders Company is equipped to help any school superintendent who expects to install printing in one school or several schools. Whatever the type of school or number of pupils, the efficient service of this Department is available.

In connection with the practical installation of printing for instructional purposes, the Education Department will write the specifications, make a blueprint layout showing the location of each piece of equipment in the proposed printshop, suggest teachers, in fact, arrange all details. This service is rendered without charge or obligation.

The staff of the Education Department is composed of persons who have had actual experience as teachers and executives in the educational field. Recommendations are therefore made from a professional standpoint.

This Education Department has assisted in the installation of probably ninety-five per cent of the three thousand school printshops in the United States.

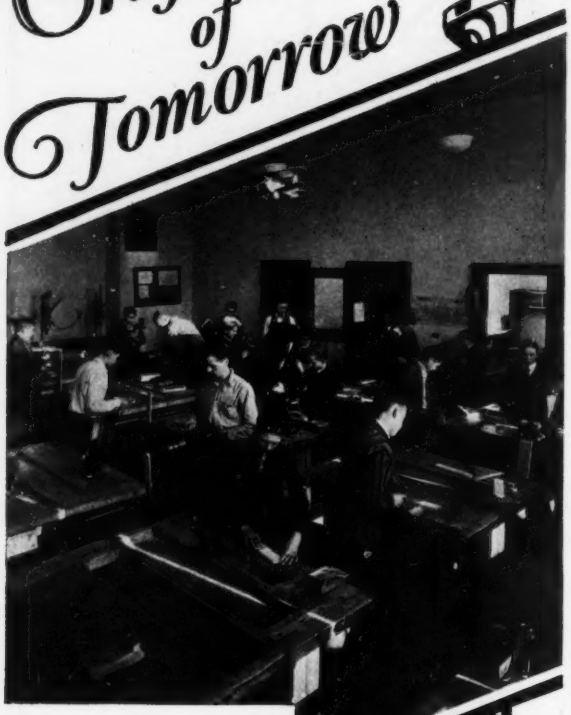
Backed by many years of unquestioned business integrity, the American Type Founders Company inspires confidence in its products, selling methods and prices. When considering the installation of a new school printshop or the purchase of additional materials for existing school printshops, write to the

EDUCATION DEPARTMENT

American Type Founders Company

300 Communipaw Avenue, *Jersey City, N. J.*

Craftsmen of Tomorrow



How eager they are to obtain your praise for good work! How joyful when you say, "Well done"! These future craftsmen are guided by the standard you set. Their craftsmanship is limited or advanced by the tools furnished them.

Genuine Irwin solid center Auger Bits are the choice of craftsmen of today.

Irwin Bits for Industrial Arts Schools make your job easier—they bore clean, finished holes. They stand up under hard use. Write for special charts for manual training use, also booklet, "How to Select, Use and Care for Bits."

THE IRWIN AUGER BIT COMPANY
Wilmington, Ohio

The IRWIN Bit
THIS BIT IS GUARANTEED TO DELIVER SERVICE
YOUR DEALER STANDS WITH US BEHIND IT
ASK HIM FOR BOOKLET "HOW TO SELECT USE AND CARE FOR BITS"
THE I.A.B.Co.
WILMINGTON O.

The IRWIN Bit
REG. U.S. PAT. OFF.

IRWIN Auger Bits

BUFFALO FORGE COMPANY OBSERVES FIFTIETH ANNIVERSARY

The Buffalo Forge Company of Buffalo, N. Y., is this year observing the golden anniversary of the founding of the company. The firm was established in 1878 by Mr. Charles Brunke and Mr. Charles Hammelman, who began the manufacture of the portable forge originated by Mr. Hammelman. The first shop was located on the fifth floor of a small building on Washington and Perry Streets, Buffalo.

In 1903 the company was enlarged with three firms under its immediate control, and in 1905 the business was incorporated as the Buffalo Forge Company with a capital investment of $1,500,000. In 1916 the firm was reorganized with Mr. H. W. Wendt as president, Mr. E. F. Wendt as vice-president, and Mr. H. W. Wendt, Jr., as secretary.

DIXON PENCILS FURNISHED TO BYRD EXPEDITION

The Joseph Dixon Crucible Company of Jersey City, N. J., furnished all the pencils used by the Byrd Expedition in the drawing of maps, the preparation of reports, and other day-by-day activities of the personnel of the Byrd flagship. Among the types of pencils used were the Dixon Eldorado, master drawing pencil, the Eldorado master shorthand pencil, the Dixon Ticonderoga general utility pencil, the Dixon lumber pencil, and the thinex and best colored pencils.

Continuation-School Law Upheld by Court. The Court of Appeals of New York City has upheld the conviction of Abraham Braunstein, Brooklyn, because his son, Elias, now more than 16 years old, failed to attend a continuation school as required by the education law of the state. The court upheld the constitutionality of the law and rejected the contention that attendance at night school was an adequate substitute. In giving its decision, the court pointed out that children at work all day, should not be compelled to study at night. It was held that day-school attendance should be encouraged, and pointed to the number of employers who are cooperating in carrying out the policy of the department.

Urge New Vocational School at Manitowoc, Wis. The city school-board and vocational officials have presented a request to the city council, asking the submission of a $300,000 bond issue for the erection of a vocational school. The present building must be vacated within a year, and the school faces the necessity of finding new quarters before September 1, 1929.

Graduates Working at Trades. Fifteen graduates of the architectural-drafting department and 22 from the watchmaking shop of the St. Paul, Minn., Vocational School, are working at their trade, according to data compiled by the school officials.

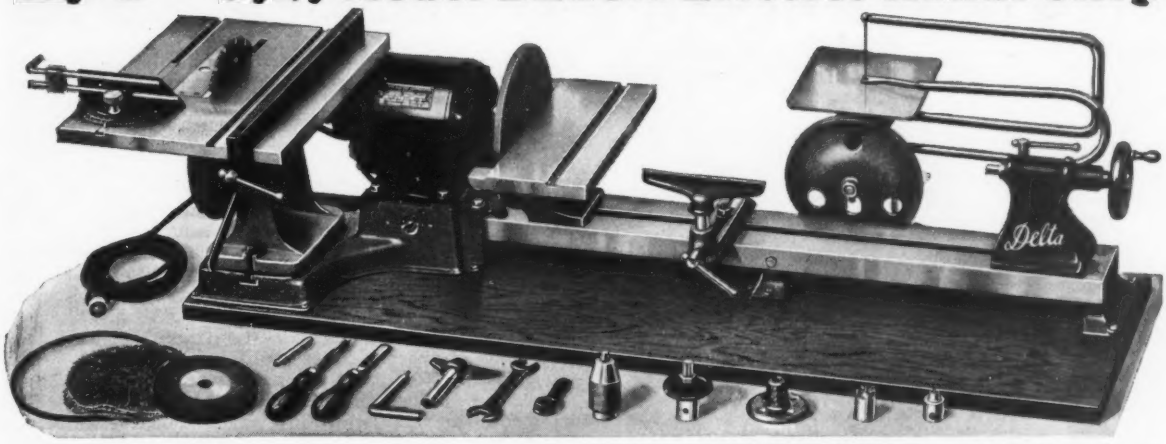
New Vocational School at Green Bay, Wis. Work has been begun toward clearing the site for the new vocational school, to be erected at Green Bay, Wis.

Ask $200,000 for Madison Vocational School. The board of industrial education of Madison, Wis., has asked for an appropriation of $236,821 for 1929, of which $201,177 must be raised by taxation. For 1928, the budget of the vocational school aggregated $229,933. In the 1929 budget, an increase of from $4,940 to $5,250 in the salary of the director is asked.

The total estimated receipts for vocational work, outside of the amount to be raised by direct taxation, aggregate $35,644. The receipts, however, will drop to about $32,000 if no Federal aid is received. It is announced that Federal aid for this year has been withdrawn and that aid will be granted only in certain courses of instruction. Where such courses of instruction are given, the school will receive only one half of the total cost of the course.

(Continued on Page 37a)

20 New Big Superior Features in the 1929 Model DELTA Electric Handi-Shop



Here are just a few of the twenty New Features which, added to the many regular **exclusive** advantages of last year's model, make the New Delta Handi-Shop incomparable.

New Delta Miter-Gauge (with many new features)
New Circular Saw Adjusting Lever
New Delta Adjustable Rip Gauge
Larger Circular Saw Table
⅓ H. P. Motor
Larger, Triple Foundation Lathe Bed
½ inch capacity Drill Chuck

DELTA SPECIALTY COMPANY
1661-67 Holton St., Dept. M-128 Milwaukee, Wis.

EACH MACHINE in the "Delta Handi-Shop" is a full-sized, high-quality unit. Delta popularity rests upon the economy and convenience of employing a single high-grade **2 Shaft** Motor to drive any one of a number of individual machines. Investigate.

DELTA SPECIALTY CO., Dept. M-128,
1661-67 Holton St., Milwaukee, Wis.

.....Please send, without obligation, FREE illustrated literature describing new 1929 Model Delta Handi-Shop.

.....Please send me copy of "How to Make Things With a Workshop."

Name .....

Address .....

Manual Training Benches

None Better Made

For information regarding our full line of superior manual training benches, domestic science, sewing and drawing tables, vises, laboratory furniture, etc., write to

C. CHRISTIANSEN

Manufacturer since 1898

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The
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This Table provides private compartments for the equipment of eight students. As will be observed by the illustration, three perpendicular lockers open in the front, while three similar ones open in the rear. Each compartment will hold a 22 x 28 drawing board, a large set of instruments, scale, triangles, ink, detailed paper, etc., with a slot for a 24-inch T square. It puts everything of the student under individual lock and key except text books. Locks may be our standard master-keyed cabinet, or padlocks if desired.

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Drawing Room Furniture for Schools and Colleges
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Kewaunee

(Continued from Page 34a)

New Teaching Devices. The board of education at Herculaneum, Mo., has given material to the building-trades class for constructing devices for teaching plumbing, sheet metal, and electricity during slack seasons and inclement weather.

A Foremanship Conference at Midwest, Wyo. A foremanship conference was held for foremen of the Midwest Oil Company at Midwest, Wyo. The conference held two sessions, one in the morning and one in the afternoon, with a third session in the evening for officials. The conference was conducted by Mr. H. A. Tiemann, state superintendent of trade and industrial education in Colorado, and was held under the auspices of Mr. F. M. Treat, state supervisor of trade and industrial education for Wyoming.

In-Service Training for Continuation-School Teachers of New Jersey for the school year 1927-28. The extension course offered by the New Jersey education department for continuation-school directors and teachers during the year 1927-28 was intended to serve the individual needs of employed minors as discovered through the study of cases.

The title of the course was "Problems Concerning the Industrial Employment of Minors" and was offered in three centers—Paterson, Jersey City, and Elizabeth. All the centers are in regions maintaining the largest number of continuation schools, so that it was possible to enroll 106 teachers from 23 districts which maintain continuation schools.

The success of the courses was made possible through the earnest and efficient assistance of Mr. Arthur F. Hopper, director of the continuation school, Plainfield, and Miss Mary Jones, principal of the Girls' Continuation School of Newark. The results have been noticeable, for teachers have become interested in following individual cases for pupils who have left continuation school, to determine in what way the school functioned, or why it did not function in the lives of those who had been under its influence.

New Building-Trades Class at Lee's Summit. The building-trades class at Lee's Summit has begun the erection of two houses and the remodeling of a third.

Build House at Flat River, Mo. The boys of the building-trades class at Flat River, Mo., have begun the erection of a four-room house. The boys will do all the work, including the laying of the foundation, the pouring of the concrete, the wiring, and painting. A local lumber dealer furnished the lot and the material, and the boys prepared the plans and figured the material for the house.

Stout Trustees Approve Budget for the School Years 1929-30 and 1930-31. The board of trustees of Stout Institute, Menomonie, Wis., has adopted a budget, calling for a total appropriation of $296,287 for capital, maintenance, and operation expenses in 1929-30, and $330,983 for the year 1930-31. Under the budget, a total of $61,739 is provided for capital expenditures in 1929-30 and $95,128 for 1930-31; the total for maintenance for 1929-30 is $23,080, and for 1930-31, $21,435; the total for operation expenses in 1929-30 is $221,460, and for 1930-31, $214,420. The board will ask the legislature to authorize the preparation of plans and specifications for a complete dormitory, and the construction of the first unit of the building during the year.

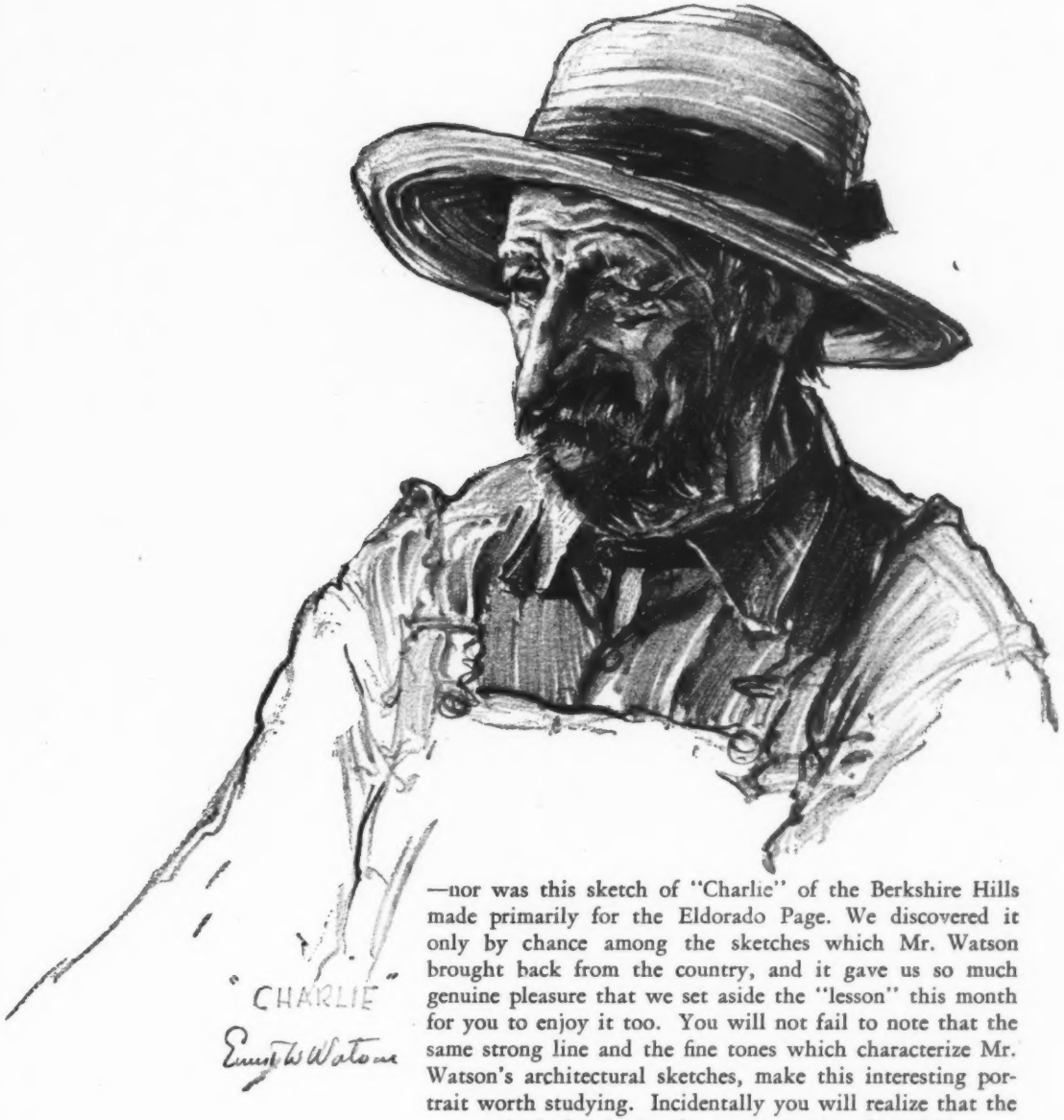
Oklahoma A. and M. College Occupies Industrial Building. The new industrial-arts building of the Oklahoma A. and M. College at Stillwater, Oklahoma, was occupied on Friday, November 23. The building is of the one-story factory type of construction, containing 38,000 ft. of floor space, and cost $150,000.

The building has windows of the steel factory type, glazed with ribbed glass. The exterior walls are of mat-faced brick, with cut-stone trimmings, and the roof is of steel construction and flat, with the exception of the central wing and the central portion of the north wing, which is of the saw-tooth type of construction.

The building contains three offices, three storerooms, a lumber room, and shops for patternmaking, farm mechanics, woodworking, forging, foundry work, machine-shop practice, general shopwork, and mechanical drawing.

The shops were open for inspection during the day and visitors were able to observe the students at work in the classes.

(Continued on Page 40a)



—nor was this sketch of "Charlie" of the Berkshire Hills made primarily for the Eldorado Page. We discovered it only by chance among the sketches which Mr. Watson brought back from the country, and it gave us so much genuine pleasure that we set aside the "lesson" this month for you to enjoy it too. You will not fail to note that the same strong line and the fine tones which characterize Mr. Watson's architectural sketches, make this interesting portrait worth studying. Incidentally you will realize that the artist had in his hand a pencil worthy of his skill.

The ELDORADO PAGE

Mr. Watson made this drawing with Dixon's Eldorado, "The Master Drawing Pencil." Are you fully acquainted with ELDORADO? If not, send for samples to the Joseph Dixon Crucible Co., Pencil Dept. 128-J, Jersey City, N. J.

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Write for booklet illustrating and describing the complete line of Sheldon Benches

E. H. SHELDON & CO.
Vocational Furniture
Muskegon, Michigan

(Continued from Page 38a)

Three meetings were held in connection with the opening of the building, one on Friday afternoon and evening, and one on Saturday morning. Prof. R. W. Selvidge of the University of Missouri, gave the main address at each of the formal meetings. Prof. DeWitt Hunt, head of the industrial-engineering department of the college, was in charge of the general program.

New Cooperative Vocational Program at Norristown, Pa. A cooperative, part-time vocational course for students of the Eisenhower High School is planned at Norristown, Pa.

Under the plan, there will be 83 boys in the vocational course. The junior-high-school classes will have nearly 100 pupils in three classes. In the shop and schoolwork, two boys will work on the same job, one each for a period of two weeks. After the ninth grade has been reached, the student will make his selection of a course. Those who elect the industrial course will continue their work with eight or ten periods per week, the time to be divided between mechanical drawing and shopwork, with four periods of drawing and six periods of shop. In the tenth grade, the students will devote thirty clock hours to vocational work. Fifteen of these hours will be in the shop and the other fifteen will be given to mathematics, drawing, applied science, English, and gymnasium. In the eleventh grade, the shopwork will be continued the same, with advanced trade mechanics, theory, and drawing as the particular related subjects.

Industrial Teacher Training in Kansas City. As a part of the Missouri program for the improvement of teachers in service, three classes were established in Kansas City during the early part of the school year. The classes were conducted with the cooperation of the University of Missouri and Teachers' College, and the enrollment and attendance proved gratifying to the instructors.

In order to make the courses as practicable to the teachers as possible, a somewhat varied plan of conducting the courses was adopted. In the first course, Organization and Administration of Industrial Arts, the major portion of the classwork was accomplished by means of questions taken from the book at the end of the chapters, in place of using the text material as the basis for discussion. Two or more members of the class were assigned certain questions and the class time was given over to the discussion of the questions by the members of the class in the light of their experience.

The second course, Classroom Management, was organized as a seminar course for a round-table discussion of classroom problems dealing with the teaching of vocational subjects.

The third course, Supervised Practice Teaching, was given to assist teachers who had adequate trade experience but a minimum of teaching experience, who were given an opportunity to apply the mechanics of teaching under supervision. The work was given on an individual basis, permitting the teacher to work out his lesson plan, and then discuss it with the teacher trainer before teaching the lesson. During the progress of the work, suggestions were given from time to time for the improvement of the instruction.

Model Airplane Building at St. Louis. The St. Louis school playgrounds recently launched a new and unusual activity—the making of model airplanes. Under the direction of Mr. John Rappold, a model airplane expert, several classes were conducted daily for an entire week, to which each of the 63 school playgrounds sent an instructor. These instructors were given instruction in the building and flying of model airplanes, and they in turn organized classes on their respective playgrounds.

In the model airplane construction project, all material, much of which was imported, was furnished free of charge by the local board of education. Considerable enthusiasm was aroused in the project not only by the playground children, but by the parents and the local civic organizations as well.

A model airplane tournament for duration flying is to be conducted at the close of the playground season, for which a north-side club has donated three trophies, to be awarded those who take first, second, and third places in the tournament. The same club has also agreed to finance the trip of the local champion to the national model airplane tournament.